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AEROSPACE MEDICINE

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STUDY OF MUSCLE BIOENERGETICS IN WEIGHTLESSNESS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian
No 5, Sep-Oct 85 pp 69-73

[Article by E.S. Mailyan, E.A. Kovalenko, and L.V. Buravkova, Moscow: "Some Results of a Study of Muscle Bioenergetics in Weightlessness"; the first paragraph is an English summary provided in the original]

[Text] The parameters of oxidative phosphorylation and the activity of cytochrome oxidase and lactate dehydrogenase were studied in the skeletal muscles of rats exposed on 3 biosputniks of the Kosmos series. An 18-22-day space flight leads to marked inhibition of oxidative metabolism and glycolysis in skeletal muscles of different morphofunctional specializations, disorders of oxidative phosphorylation conjugation and reduced activity of the studied enzymes. Muscular tissue respiration was restored by the end of the first month of the readaptation period.

It is well known that all types of energy consumption, whether at rest or in the course of various activities on the ground, include spending an amount of energy to surmount the force of gravity. In weightlessness, these efforts are no longer needed, which may cause a modification of the energy homeostasis. The need for studying bioenergetic processes in skeletal muscles is emphasized by the fact that the muscular system, which plays a major role in energy- and heat-formation processes of the body, is also one of the main targets affected by weightlessness. The pathogenetic mechanisms of functional muscular insufficiency in the postflight period are still not understood completely.

This study was concerned with an investigation of the processes of oxidative phosphorylation and activities of certain oxidative enzymes in the skeletal muscles of albino rats at various times in the postflight period. The rats were exposed for 18 to 22 days on Kosmos-605, Kosmos-936 and Kosmos-1129 biological satellites.

Methods

Experiments were conducted on groups of rats: a flight group, a vivarium control group and a group of on-the-ground simultaneous experiment, where the animals in a land mockup of the spacecraft were exposed to all factors of a spaceflight except for weightlessness. The studies were performed on mitochondria suspensions separated by differential centrifuging [7] from the posterior femoral muscles (PFM) group and homogenates of the same muscle group, as well as anterior tibial muscle (ATM) and quadriceps femoris (QF). In the Kosmos-605 experiment the mitochondria were separated immediately after decapitation, while in Kosmos-936 and Kosmos-1129 the preparations were obtained from the muscles after conservation at a low temperature: In the former case, the muscles were frozen in liquid nitrogen and stored at -70°C for 3 days, and in the latter a cryoprotector was used (20% glycerine solution) and the muscles were stored for 2 days in saccharose ice (in a range from 1 to -7°C). The oxidative phosphorylation parameters were determined by using Warburg's method and polarographic analysis [2]. The activity of cytochrome oxidase (CCO) was evaluated by the mitochondrial respiratory dynamics as increasing concentrations of cytochrome *c* were added. The enzymatic activity was characterized by a curve plotted in a coordinate system correlating the consumption rate of O_2 (plotted on the ordinate) with the cytochrome *c* concentration (on the abscissa) expressed by their inverse values. The CCO activity was expressed by the inverse of the ordinate intercept. The total activity of lactate dehydrogenase (LDH) was measured in the supernatant produced as a result of mitochondrial separation after last centrifuging; Boehringer sets on an SF-16 spectrophotometer with a wavelength of 600 nm were used.

Results and Discussion

The studies showed (table 1) that the flight group of rats 48 hr after the landing of Kosmos-605 biological satellite experienced a 40-50% reduction of tissue respiratory rate (ΔO) and of phosphorylation level (ΔP) in PFM as compared both with the vivarium control group and the simultaneous experimental group (the oxidation substrate was succinate). This indicated a profound suppression of oxidative processes and energy accumulation reactions in muscular tissue. By the 25th day, the alterations leveled out.

The suppression of tissue respiration and oxidative phosphorylation that was observed could greatly reduce the energy potential of the muscular cell. The weakened capacity for generation of macroergs could lead to substantial disruptions of the processes of biosynthesis, specific cell functions and the metabolic reactions which involve energy consumption.

The polarographic investigation of the status of oxidative phosphorylation in PFM showed that 10 hr after the landing of Kosmos-936 satellite the flight group of animals experienced significant suppression of substrate respiration (V_{4n}) with oxidation of both NAD-dependent substrates (α-ketoglutaric and glutaminic acids) and the succinic acid (by 26, 29 and 42%, respectively; table 2). In the registration of ADP-dependent respiration (V_3), which reproduced in the cell the metabolic state of

mitochondria during active functional state of muscles, the postflight suppression of oxidative metabolism was even more pronounced (by 34, 46 and 44%, respectively).

This regularity was confirmed also by measurements of the activity of CCO terminal oxidation enzyme: On day 1 of readaptation period, the enzymatic activity in the flight group was greatly reduced (by 50-56%) (14.37 ± 1.6 nmole of O_2 per 1 mg of protein in 1 min, as compared with 32.63 ± 5.73 and 28.67 ± 3.75 nmole O_2 per 1 mg protein in 1 min in the simultaneous test group and the control group, respectively). The glycolytic processes in the period were also subdued. This is indicated by a 48-53% reduction of overall LDH activity. By day 25, all the respiratory parameters and enzymatic activities were restored to the level of control values or were even slightly higher.

Table 1. Indicators of Oxidative Phosphorylation in Homogenates of Skeletal Muscles of Rats in Postflight Period, ΔO and ΔP (M ± m)

Experimental series	ΔO	ΔP	P/O
	mc-atom/100 mg tissue in 1 hr		
Vivarium control (18)	7.30 ± 0.29	8.07 ± 0.59	1.11 ± 0.22
Simultaneous experiment, day 2 (7)	5.46 ± 0.56*	5.71 ± 0.68*	1.06 ± 0.12
Flight experiment, day 2 (4)	3.37 ± 0.36**	3.34 ± 0.28**	1.02 ± 0.10
Simultaneous experiment, day 26 (6)	6.11 ± 0.56	8.63 ± 0.91	1.43 ± 0.11
Flight experiment, day 26 (5)	7.59 ± 0.31	10.60 ± 0.96	1.40 ± 0.11

Note. Single asterisk indicates the confidence of differentiation compared with the vivarium control group; double asterisk compared both with vivarium control group and simultaneous experiment. Here and in tables 2 and 3 the number of animals is given in parentheses.

On the basis of these data, a sequence of events in the readaptation period can be visualized, which is probably determined by the general adaptation mechanism [4]. It can be assumed that the suppression of oxidative phosphorylation the first day postflight is the source of the deficiency of the synthesis of macroergic compounds and works as a stimulus of metabolic processes conducive to adaptation to the intensified functioning level in gravity conditions. This signal probably increases the biogenesis of mitochondria, and with increasing mitochondrial synthesis the production of

Table 2. Respiratory Rates of Mitochondria (in nmoles of O_2 per 1 mg of protein per 1 min) and LDH activity (in ME per 1 mg protein) in Skeletal Muscles on Day 1 of Readaptation Period (M ± m)

Indicator	Oxidation substrate	Vivarium control group (5)	Simultaneous experiment group (5)	Flight group (5)
V_{4n}	Succinate	13.28 ± 1.87	17.0 ± 1.26	9.86 ± 1.10*
	Glutamate	3.17 ± 0.46	4.32 ± 0.57	3.08 ± 0.65
	α-Ketoglutarate	10.12 ± 1.74	10.07 ± 0.93	7.43 ± 0.68
V_3				
	Succinate	16.32 ± 2.27	19.54 ± 1.04	11.02 ± 1.31**
	Glutamate	5.18 ± 1.13	4.91 ± 0.86	2.65 ± 0.30***
	α-Ketoglutarate	11.03 ± 1.84	12.04 ± 0.75	7.96 ± 0.58*
LDH activity		54.9 ± 5.0	49.7 ± 5.73	26.2 ± 2.59*

Note. Asterisks indicate the confidence of differentiation compared with the simultaneous experiment: single asterisk $P < 0.01$, double asterisk $P < 0.001$, triple asterisk $P < 0.05$.

Table 3. Respiratory Characteristics of Mitochondria Isolated from Rat PFM: Day 1 of Readaptation Period (M ± m)

Parameter	Oxidation substrate	Vivarium control group (9)	Simultaneous experiment group (7)	Flight group (6)
V_{4n}	Succinate	13.4 ± 0.99	7.29 ± 1.94*	8.38 ± 0.88*
	α-Ketoglut.	10.16 ± 0.84	6.14 ± 1.81*	6.64 ± 0.96*
V_3	Succinate	17.43 ± 1.25	11.51 ± 2.21*	14.98 ± 1.38
	α-Ketoglut.	17.54 ± 1.10	11.56 ± 2.06*	11.52 ± 1.19*
V_{4o}	Succinate	13.66 ± 1.69	8.49 ± 1.46*	9.00 ± 1.03*
	α-Ketoglut.	13.46 ± 1.14	8.53 ± 1.36*	8.34 ± 1.34*
Respiratory ratio	Succinate	1.35 ± 0.11	1.33 ± 0.10	1.45 ± 0.14
	α-Ketoglut.	1.32 ± 0.06	1.56 ± 0.13	1.39 ± 0.17
ADP:O	Succinate	0.20 ± 0.017	0.28 ± 0.027*	0.14 ± 0.017**
	α-Ketoglut.	0.21 ± 0.013	0.21 ± 0.019	0.20 ± 0.026
Phosphorylation rate, M/min	Succinate	18.39 ± 4.63	22.20 ± 3.59	9.53 ± 0.54**
	α-Ketoglut.	15.14 ± 0.91	16.08 ± 5.13	10.59 ± 1.18*
Phosphorylation time, min	Succinate	3.40 ± 0.51	3.12 ± 0.62	5.32 ± 0.27**
	α-Ketoglut.	3.37 ± 0.22	4.73 ± 1.03	5.03 ± 0.46*

Note. Respiratory rates in nmoles of O_2 per 1 mg protein per 1 min. Single asterisk indicates the confidence of differentiation with respect to the vivarium control group indicator; double asterisk as compared with both vivarium control group and the simultaneous experiment.

ATP per unit of tissue weight is increased, compensating for the ATP deficit In our studies, this hypothesis was confirmed by a rise of the functional activity of mitochondria (intensification of respiration and enzymatic activity), as well as an increase in the mitochondrial protein content by day 25.

In the investigation of rats from Kosmos-1129 satellite, the polarographic analysis of oxidative phosphorylation was done on muscles with different functional specializations. At 10 hr postflight, the mitochondria separated from PFM confirmed again the suppression of respiration in the flight group of animals, both before and after ADP was added to the incubation medium during the oxidation of succinic and NAD-dependent α-ketoglutaric acid (table 3). The considerable suppression of respiration not only in the flight group but in the simultaneous group of animals as well suggests that the processes of tissue respiration were suppressed by the entire set of factors of a spaceflight. The disruption of the conjugation of oxidative phosphorylation, however, was observed only in the flight group and should be viewed as a consequence of the weightlessness as such. The decoupling of the process of oxidation and phosphorylation was indicated by a decline of the ADP:O ratio. Besides, the time characteristics of the function of the respiration chain were modified remarkably: The phosphorylation time was increased with a resulting reduction of the phosphorylation rate. As in the preceding experiment, the overall LDH activity at 10 hr postflight was also reduced (6.35 ± 0.45 vs 9.25 ± 0.98 ME per 1 mg of protein in the control group).

The reduced intensity and efficiency of energy-producing systems of the muscular cell observed in the experiment is due to several factors. One of the main causes in our view is the absence of systemic ADP formation by ATP hydrolysis during contraction of myofibrils. According to a well-known hypothesis [8], proportions of adenyl system components characteristic of a nonworking muscle should have an inhibiting activity on the enzymes of glycolysis and the Krebs cycle. The observations at a later time (day 6 of readaptation period) revealed an even greater suppression of mitochondria respiration in the flight group, while in the simultaneous test group restitution processes were already manifest, even with overcompensation effects [3]. The indicators became normal in the flight group much later --at day 29.

In order to investigate whether these regularities are universal and apply to other muscles with different ratios of fast and slow fibers, a comparative study of the parameters of oxidative phosphorylation was done in homogenates of three muscle groups of different composition: the central head of QF, which consists mainly of slow fibers, ATM, which consists mainly of fast fibers, and PPM, a mixed-type muscle. Despite the differences of morphofunctional specialization, all these muscles revealed a similar pattern of response of energy metabolism to weightlessness, which coincided with the mitochondrial response: In the flight group the tissue respiration was suppressed on the first day postflight; by the sixth day the suppression was even more pronounced, while recovery was obtained only by the end of the month (fig. 1). In the simultaneous test group, the initial suppression

period was followed by a drastic activation by the sixth day. Remarkably, the increase of the respiratory control was lower in the rats of the flight group than in the animals of the simultaneous test group. This indicated a decoupling of oxidative phosphorylation in the first hours after exposure to weightlessness.

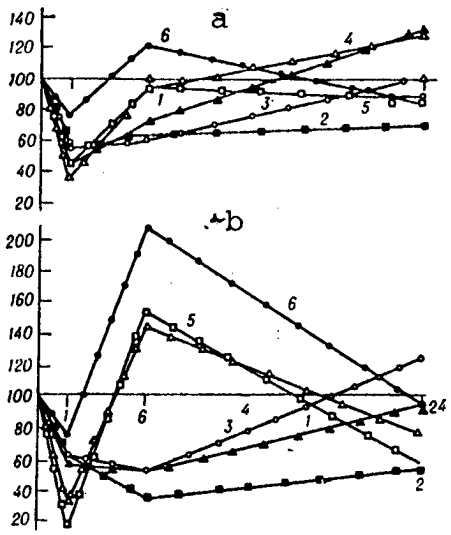

Fig. 1

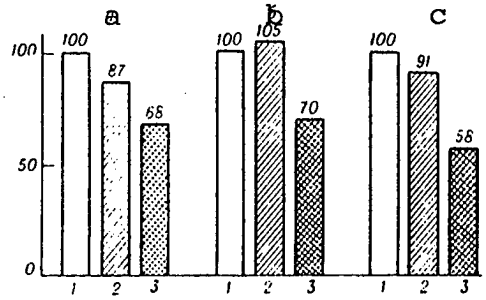

Fig. 2

Figure 1. Respiratory rates of homogenates of various muscles in the third metabolic state of postflight animals. Oxidation substrates: (a) succinate, (b) α-ketoglutarate. (1,4) ATM, (2,5) QF, (3,6) PFM, (1-3) flight series, (4-6) simultaneous series. The ordinate plots the respiratory rate (% of vivarium control indicators); abscissa plots observation periods (days).

Figure 2. Variation of oxidative and energy reactions in muscles in the postflight period (cumulative data for three biological satellites). (a) Respiratory rate, (b) conjugation with oxidative phosphorylation, (c) glycolysis activity. (1) Control, (2,3) simultaneous and flight series, respectively. Data are given as percentages of control group characteristics taken for 100%.

These initial data suggest that an 18-22-day spaceflight results in a considerable supression of oxidative metabolism and glycolysis in mixed-type skeletal muscles, a disruption of the conjugation of oxidative phosphorylation and a weakening of the flow of accumulated energy in myocytes (fig. 2). This conclusion is confirmed by the data on accumulation of large quantities of glycogen in muscular cells several hours after the flight [6]. The modifications should be regarded as biochemical symptoms of the loss of training by muscular systems and can be one of the pathogenetic mechanisms of the functional deficiency of a muscular system in the postflight period [1, 5].

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9922
CSO: 1840/160

INSTITUTIONS OF UKRAINIAN SSR ACADEMY OF SCIENCES RESEARCH ON PLANT GROWTH REGULATORS WITH AGRICULTURAL APPLICATIONS

Kiev VISNYK AKADEMIYI UKRAYINSKOYI RSR in Ukrainian No 9, Sep 86 pp 51-55

[Article by V.P. Kukhar, academician, UkrSSR Academy of Sciences, L.M. Markovskiy, corresponding member, UkrSSR AS, M.O. Lozinskiy, doctor of chemical sciences, and Yu.V. Karabanov, V.S. Petrenko and L.I. Reydalova, candidates of biological sciences]

[Abstract] Studies within the Ukrainian SSR Academy of Sciences on plant growth regulators (PGR), have a long history and were originally initiated by Academician M.H. Kholodnyy. While originally limited to the biological laboratories and research institute of the Academy, these studies eventually spread to the chemical establishments and now constitute an integrated, multidisciplinary program. Beginning with 1983, a number of active PGR preparations have been synthesized at the Institute of Organic Chemistry of the Ukrainian SSR Academy of Sciences, and have had a significant impact on Soviet agriculture. Among the more successful agents are dekstrel [sic], several varieties of ivin [sic], oksiamin (oxyamine?), and others. More recently, a number of derivatives of benzo-2,1,3-thiadiazole have been shown to be potent PGRs, and promise to expand even further the supply and variety of agents with potential agricultural application.

12172/9716
CSO: 1840/125

NEUROTOXINS AS PROBES IN STUDIES ON ION CHANNELS

Kiev VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR in Ukrainian

No 4, Apr 86 pp 88-89

[Article by O.A. Kryshtal, corresponding member, Ukrainian SSR Academy of Sciences, and N.G. Gimmelreykh, candidate of biological sciences]

[Text] The USSR State Prize has been awarded to a group of scientists representing a number of institutions for their studies on the molecular mechanisms of nerve impulse generation and the development of an extensive arsenal of research techniques.

Among those honored in this fashion is Valeriy Kazimirovich Lishko, director of the Institute of Biochemistry of the UkrSSR Academy of Sciences and academician of the Academy, a renowned specialist in the fields of neurochemistry and membrane studies.

Detailed structural studies on membrane proteins began in the USSR more than ten years ago, in order to gain a better understanding of the ion channels that determine the ability of a cell to undergo the transition from a resting state to one of excitability. Two All-Union scientific programs -- Nerve Impulse and Ion Channel -- were established to harness the efforts of electrophysiologists, chemists, physicists, biologists and scientists representing other disciplines.

The primary research approach consisted of utilization of natural neurotoxins, substances synthesized by some plant and animal organisms as a protective mechanism. In most cases neurotoxins alter the function of ion channels. More than thirty previously unknown toxins were isolated in the pure state. The chemical structure of some toxins has been elucidated and methods have been developed for their complete synthesis. Various labels -- radioactive, fluorescent, or photosensitive -- have been introducted into the toxin molecules in order to mark the ion channels. Approximately seventy neurotoxins have been derivatized in this manner.

Even at the earliest stages of research a special effort was made to obtain a detailed understanding of the mechanism of action of the neurotoxins on ion channels and their receptors, as well as on the use of the neurotoxins in the identification of proteins making up the channels.

These studies provided important data on the structure and functional characteristics of selected neurotransmitter-sensitive ion channels of nervous tissues. Most of the studies concerned electroexcitable sodium channels that play a key role in the generation and propagation of action potentials in nerve cells and tissues, as well as in the myocardium and skeletal muscles.

As a result of the studies on the sodium channels by electrophysiologists and biochemists important data have come to light on the functional significance of the various structural components of such channels. Considerable attention was devoted to the combined action of selected neurotoxins and drugs, such as anesthetics, antiarrhythmics and anticonvulsants. The result was an insight into the development of a novel class of substances designated as modulators of drug action.

For many years the research projects headed by Academician V.K. Lishko have been concerned with defining the steps involved in the biogenesis of those membrane proteins that function as structural elements in sodium channels. Thanks to these efforts, it is now obvious that some of these proteins exist in the soluble state. Such proteins can combined with synthetic membranes to form transmembranous structural loci whose functional characteristics can be regulated by specific neurotoxins.

This award-winning research is of seminal importance in that it points the way toward novel medicinal agents that may find therapeutic applications in neurology.

12172
CSO: 1840/124

UDC 577.352.26:577.112'314.6:579.842.23

ISOLATION OF PORE-FORMING PROTEIN FROM OUTER MEMBRANE OF YERSINIA PSEUDOTUBERCULOSIS AND STUDIES OF ITS EFFECTS ON BILAYER LIPID MEMBRANE CONDUCTANCE

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 12, Dec 85 (manuscript received 4 May 85) pp 1219-1224

[Article by G.N. Likhatskaya, O.D. Novikova, T.F. Solovyeva and Yu. S. Ovodov, Institute of Chemistry, Far Eastern Science Center, USSR Academy of Sciences, Vladivostok; Pacific Ocean Institute of Bioorganic Chemistry, Far Eastern Science Center, USSR Academy of Sciences, Vladivostok]

[Abstract] Yersinin, a polypetide with molecular weight 40kDa, is the major protein component of the outer membrane of Yersinia pseudotuberculosis. This protein is similar to porins, proteins which form hydrophilic pores in the outer membrane of gram-negative bacteria. The active form of porins providing permeability to the outer bacterial membrane is a trimer. This work deals with isolation and study of the pore-forming activity of the oligomer and monomer forms of yersinin by incorporation into bilayer lipid membranes. This incorporation causes gradual changes in lipid membrane conductivity, with activation energy 46kG/mole, indicating the formation of pores of about 1.5nm in diameter. Yersinin is thus a member of the class of porins, producing pores with diameter and electrical characteristics analogous to the channels of porins of other enterobacteria. Figures 6; references 15: 2 Russian, 13 Western.

6508/9716
CSO: 1840/147

BIOPHYSICS

UDC 577.3:591:104:612.813

EFFECTS OF VARIOUS N-CHOLINOMIMETICS ON BEHAVIOR OF Cl^--SELECTIVE ION CHANNELS OF NEURAL MEMBRANES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 5, Oct 86 (manuscript received 15 Apr 86) pp 1264-1267

[Article by T.T. Ivanova, V.I. Ilyin, F.E. Ilyasov and B.N. Veprintsev, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Comparative analysis was conducted on the effects of acetylcholine and a variety of its agonists on Cl^- permeability of isolated parietal ganglia obtained from the large pond snail. These neural membranes have been shown to contain a homogenous population of nicotinic cholinergic receptors that regulate Cl^- currents exclusively. With a membrane potential of -100 mV the open-closed Cl^- channel half-life was calculated at 31.4 $\pm$ 5.1 msec for acetylcholine, 4.7 $\pm$ 2.5 msec for suberylcholine diiodide, 9.2 $\pm$ 1.0 msec for tetramethylammonium bromide, and 6.4 $\pm$ 0.9 msec for carbacholine chloride. Evaluation of single-channel conductivity yielded a value of 7-9 pC for all of the agents ($\pm$10%). In summary, the data were interpreted to indicate that the half-life values reflected the lifetime of transmitter-receptor complex, with the notation that a definitive conclusion can only come from patch-clamp studies. Figures 1; references 14: 10 Russian, 4 Western.

12172/9716
CSO: 1840/121

UDC 578.8.083.13

CYTOLAR, MICROCARRIERS FOR CULTIVATION OF SURFACE-DEPENDENT CELLS

Moscow VOPROSY VIRUSOLOGII in Russian Vol 30, No 6, Nov-Dec 85 (manuscript received 28 Mar 85) pp 721-725

[Article by V.P. Grachev, M.A. Zavalnyy, A. Kh. Zitsmanis, M.K. Klyavinsh, V.D. Popova, L.L. Mironova and A.Ye. Gutmanis, Institute of Poliomyelitis and Viral Encephalites, USSR Academy of Medical Sciences, Moscow; "Biolar" Scientific-Production Association, Olayne, Latvian SSR]

[Abstract] Large-scale cell cultivation methods are required for the future development of biotechnology. The most promising of these is the method of growing surface-dependent cells on the surface of tiny particles suspended in a nutrient medium. Several types of such microcarriers have been developed and synthesized by the authors. This article presents results of testing of one such microcarrier synthesized from denatured collagen. The "cytolar" microcarrier is spherical with a smooth surface, is transparent and hydrophilic, particle diameter 230 $\pm$ 60 μm, specific gravity 1.08 g/cm^3. One cubic centimeter of densely packed cytolar particles has slightly over 150 cm^2 of surface area. Several cell cultures have been successfully cultivated on these carriers. Figures 3; references 16: 3 Russian, 13 Western.

6508/9716
CSO: 1840/176

UDC 615.37:578.74].012

PRODUCTION OF ASCITIC PREPARATIONS OF MONOCLONAL ANTIBODIES

Moscow VOPROSY VIRUSOLOGII in Russian Vol 30, No 6, Nov-Dec 85 (manuscript received 8 Feb 85) pp 749-752

[Article by A.S. Novokhatskiy, I.V. Malakhova, S.Ya. Gaydamovich, Ye.E. Melnikova, N.A. Sveshnikova, T.G. Mikhayeva, L.Ya. Kunitskaya, N.Ye. Litvinovich and T.M. Shutkova, Institute of Virology imeni D.I. Ivanoskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Two methods are known for production of massive cultures of hybrid cells: in vivo, by induction of ascitic tumors in syngenous animals, and in

vitro, in stationary or agitated suspension cultures. Suspension cultivation can produce 1-10 μg immunoglobulin per ml nutrient medium, ascitic tumors can produce 2-5 mg per ml of ascitic fluid. Production of cultures requires the use of special growth media containing a minimum of expensive embryonal serum. The usual method of accumulation of mouse monoclonal antibodies is therefore the ascitic tumor method. The authors studied the peculiarities of development of ascitic tumors and fluids with massive administration of hybridoma cells producing monoclonal antibodies to viral antigens in BALB/c mice. MAK-14-7 mouse hybridomas were used, producing IgM monoclonal antibodies to the surface antigen of the Venezuelan equine encephalitis virus, plus KAMA-51, producing monoclonal IgG reacting to the surface antigen of the tick-borne encephalitis virus. The mice received 10-20 million cells per mouse intraperitonially in about 1 ml of suspension. This method produces large volumes of ascitic fluid or blood serum containing significant quantities of monoclonal antibodies. References 16: 7 Russian, 9 Western.

6508/9716
CSO: 1840/176

UDC 547.458:576.8:663.1:576.343

POSSIBILITY OF UTILIZING CRYPTOCOCCUS AND LIPOMYCES YEAST FOR PRODUCTION OF GLUCURON-CONTAINING POLYSACCHARIDE

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 7, Jul 86 (manuscript received 13 Oct 85) pp 119-123

[Article by I.F. Ventinya, A.Ya. Ozola and S.R. Vilks, Order of Labor Red Banner Institute of Organic Synthesis, Latvian SSR Academy of Sciences; Latvian Order of Labor Red Banner State University, Imeni P. Stuchka]

[Abstract] Synthesis of the anti-viral preparation gludantan requires D-glucuronic acid, which also has therapeutic properties. The hetero-polysaccharides of yeasts of the genera Cryptococcus and Lipomyces contain 20% or more D-glucuronic acid. The relatively simple structure of these hetero-polysaccharides facilitates isolation of the acid. The authors studied the temperature conditions of growth of cultures of these yeasts, and found that the optimal temperature for both types is 24°C. Stabilizing the pH over 5 by increasing the pH of the initial nutrient medium to 6.5 reduces the production of homo-polysaccharide and thus increases the yield of D-glucuronic acid. Use of adapted seed materials reduces the cultivation time in both cases. The viscosity of the medium correlates with the quantity of hetero-polysaccharide formed, so that viscosimetry can serve as a rapid method for determination of the quantity of polysaccharide formed. L. Starkeyi strain 4.1 is recommended for production of the hetero-polysaccharide containing D-glucuronic acid. Figures 4; references 19: 15 Russian, 4 Western.

6508/9716
CSO: 1840/122

ENVIRONMENT

NUCLEAR POWER EFFECTS ON GLOBAL HEALTH

Leningrad LENINGRADSKAYA PRAVDA in Russian, 22 Oct 86 p 3

[Article by G. Ivanitskiy, Director, Institute of Biophysics, USSR Academy of Sciences]

[Abstract] This article presents an answer to a question asked by a reader concerning the influence of radiation on living organisms. In the response, Ivanitskiy notes that the Chernobyl disaster has generated an information explosion in many nations. Studies of the influence of small doses of radiation on living organisms are of the greatest significance for radiobiology today. The question for tomorrow is how power engineering should be developed for the future. Can renewable, ecologically-clean power sources such as the sun, the wind and the tides be used? Unfortunately, there are as yet no realistic methods of broad utilization of renewable power sources with acceptable efficiency. Nuclear power plants are the only reality for energy of the future, due to their high efficiency. Science is now studying the influence of low doses of radiation such as those produced by nuclear power plants on the global level. What would be the effect on life if the background radiation of the planet were increased by 15-20%? This might lead to massive mutations. Man cannot answer this question, since neither his experiments nor his computers are capable. The major lesson of Chernobyl is that in the event of a nuclear war, all would be affected by the nuclear disaster: the attacker, the nation attacked, and even neutral nations not directly involved in the war.

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CSO: 1840/103

EPIDEMIOLOGY

HEMORRHAGIC FEVER IN USSR

Saratov STEPNYYE PROSTORY in Russian No 9, Sep 86 pp 47-48

[Article by D.I. Drankin, chief, Chair of Epidemiology, Saratov Medical Institute]

[Abstract] In the USSR hemorrhagic fever with renal syndrome (HFRS) extends from the Pacific to the Atlantic Ocean along the forest and forest-steppe belts. Highest incidence of HFRS is encountered in the Mari and Tatar ASSRs and in the Kuybyshev and Saratov Oblasts. The primary vertebrate host implicated in HFRS is the bank vole, and the clinical incidence is directly correlated with the density of the vole population in a given year, with transmission to man proceeding either via direct contact or exposure to articles or food contaminated with vole excreta. Generally, on a seasonal basis the highest incidence of HFRS is encountered in summer and autumn, with occupationally-exposed males predominating among the patient population. Obvious control measures include elimination of the rodents and limitation of their access to human environments. Hospitalization is mandatory in view of the severity of the disease. Another hemorrhagic entity encountered in Ukraine (Crimea), Central Asia, Krasnodar and Stavropol Krays, and in the Astrakhan Oblast is the Crimean Hemorrhagic Fever (CHF). CHF is caused by a virus, transmitted by a tick, and also affects a number of vertebrate hosts (rabbits, cattle, birds). Unlike HFRS, CHF has no renal complications and recovery in two to three weeks is the rule. The hemorrhagic fevers have been studied in the USSR for over fifty years. Much has been learned about them, but the settling of new territories poses novel problems and requires new solutions.

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CSO: 1840/106

UDC 616.936(575.4)

CURRENT STATUS OF MALARIA IN TURKMEN SSR

Ashkhabad ZDRAVOOKHRANENIYE TURKMENISTANA in Russian No 7, Jul 85 pp 22-26

[Article by O. Mamedniyazov, Z.I. Maziashvili and K.V. Morozova, Institute of Zoology, Turkmen SSR Academy of Sciences; [Turkmen] Republic Sanitary-Epidemiologic Station]

[Abstract] Global exacerbation of malaria has also touched the USSR, particularly as regards cases imported from Africa and Asia. Tertian malaria imported by tourists and visitors from Asia poses a particular challenge because of susceptible mosquitoes. In Turkmenistan, susceptible mosquitoes posing a threat to human health have been identified as Anopheles superpictus, A. claviger, A. pulcherrimus, A. hyrcanus and A. sacharovi. The problem is further exacerbated by the prevalence of resistance among the mosquitoes in question to various insecticides, although more recently considerable promise has been shown by biological control methods. Education measures, avoidance of mosquito bites, and close monitoring of irrigation ditches and canals--which have been considerably expanded in recent years--are measures that must be implemented to prevent the problem from eventually becoming an endemic concern. References 5 (Russian).

12172/9716
CSO: 1840/2201

UDC 616.98:578.832.1]-036.22(575.4)"1983"

INFLUENZA EPIDEMIC OF 1983 IN DUSHANBE

Moscow VOPROSY VIRUSOLOGII in Russian Vol 30, No 6, Nov-Dec 85 (manuscript received 5 Mar 85) pp 741-743

[Article by G.I. Fedorova, L.P. Gurachevskaya, A.I. Kuryanova, M.F. Fatkhutdinova, V.A. Isachenko and A.N. Slepushkin, Institute of Virology imeni D.I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] The USSR influenza epidemic of 1983 started almost simultaneously in Murmansk, Leningrad and Dushanbe, after reports of epidemic spreading of A(H3N2) influenza virus in America, Europe and Asia. Dushanbe is remote from the main internal and international travel routes in the USSR, but was still one of the first 3 cities in the USSR where the influenza epidemic broke out. This article analyzes the specifics of development and the etiology of the 1983 influenza epidemic in Dushanbe. The A/Texas/1/77 (H3N2) virus was first observed in epidemic proportions in December, 1979, with the epidemic quite severe in Dushanbe, 12% of the population becoming infected in a very short time. Both in 1979 and 1983, the epidemic touched primarily children 7 to 14 years of age, with more preschoolers involved in 1983. This is not the first time that new variants of local strains have caused epidemics of influenca in Dushanbe. The authors conclude that the epidemic was not caused by a strain of virus brought in from abroad, but rather a new drift variant developing by gradual variation of local virus strains. Figure 1; references 7 (Russian).

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UDC 575.1:576.851.5

INTEGRATION OF VARIOUS PLASMIDS INTO BACILLUS SUBTILIS CHROMOSOME

Moscow GENETIKA in Russian Vol 21, No 10, Oct 85 (manuscript received 30 Nov 84) pp 1618-1626

[Article by F.K. Khasanov, V.I. Bashkirov and A.A. Prozorov, Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] Some characteristics of integration of temperature-sensitive pE194, pGG10 and pGG20 plasmids into the Bac. subtilis chromosome were studied to determine if the capacity for such integration was unique to pE194. Some auxotrophic mutations were obtained by insertion of these plasmids into the chromosome. The sites of plasmids for illegitimate recombination were determined by DNA hybridization on nitrocellulose filters. S. aureus plasmid pC194 and E. coli plasmid pBR322 were found to be capable of integration into the Bac. subtilis chromosome as well as plasmid pE194. It appeared that DNA of any origin has the capacity for integration into the Bac. subtilis chromosome. The effect of Bac. subtilis rec-mutations on the frequency of mutations was discussed briefly. The system of incorporation of plasmids into the Bac. subtilis chromosome was found to be a suitable model for studying mechanisms of "illegitimate" recombination which is so prevalent in the most diverse organisms. Figures 3; references 16: 4 Russian, 12 Western.

2791/9716
CSO: 1840/163

UDC 575:591.18

INTERACTION OF GENETIC AND ENVIRONMENTAL COMPONENTS IN DETERMINING ACTIVITY OF TRYPTOPHAN HYDROXYLASE ACTIVITY IN BRAIN OF MICE UNDER STRESS

Moscow GENETIKA in Russian Vol 21, No 10, Oct 85 (manuscript received 18 Jul 84; revised manuscript received 24 Dec 84) pp 1680-1684

[Article by A.V. Kulikov, L.A. Koryakina and N.K. Popova, Institute of Cytology and Genetics, USSR Academy of Sciences, Siberian Department, Novosibirsk]

[Abstract] A study of the interaction of genetic and environmental components of phenotypical diversity of reactions of the serotonin system of the brain of 11 strains of male inbred mice (BALB/c, CC57BR, C57BL/6J, DD, AKR, DBA1, DBA/2j, A/He, C3H/He, CBA and YT) subjected to cold (+4° C for 1 or 6 hours) and close confinement for 1 or 6 hours was described and discussed. The mice were decapitated and the brain removed; tryptophan hydrolase (TH) activity was then determined fluorometrically. Differences in reaction of serotoninergic mechanisms in mice subjected to stress, assessed by change of TH activity, were due, basically, to genotypic differences. Control of TH activity by different genetic systems of mice in a normal setting and in those under stress was revealed. Differences in hereditary mechanisms, which determine TH reaction under different kinds of stress were observed. The absence of a genotypic correlation between basal activity of TH and changes of it during cooling and emotional stress shows that genetic systems which determine reaction of the enzyme are not connected with the system which controls the structure of the enzyme molecule and ensure a more precise adaptation of the serotonin system to rapidly changing environmental conditions. Figure 1; references 16: 9 Russian, 7 Western.

2791/9716
CSO: 1840/163

UDC 633.11.+633.14:631.523/524

GENETIC PRINCIPLES OF TRITICALE CREATION. PART 3. DYNAMICS OF CYTOGENETIC STABILIZATION AND FORMATION OF PRODUCTIVITY TRAITS OF PLANTS IN EARLY GENERATIONS (F_1-F_5) OF NEW TRITICALE PLANTS

Moscow GENETIKA in Russian Vol 21, No 10, Oct 85 (manuscript received 11 Feb 85) pp 1705-1712

[Article by I.A. Gordey and G.M. Gordey, Belorussian Scientific Research Institute of Agriculture, Minsk Oblast]

[Abstract] Results of a study of the dynamics of cytogenetic stabilization, pollen fertility, aneuploidy and formation of productivity traits of plants in early generations (F_1-F_5) of new hexaploid triticale are presented and discussed. Relative cytogenetic stabilization occurred in F_4-F_5 and formation of traits of ear productivity were completed, basically, in F_4-F_5. New

morphogenetic traits, not found in initial varieties of wheat and rye, appeared in the triticale plants, indicating that these triticale plants differ from the parental species in basic systematic traits and genome composition. The advisability of selecting genetically stable genotypes which are valuable for selection purposes, in the 4th and 5th generations, is demonstrated. Figures 4; references 15: 12 Russian, 3 Western.

2791/9716
CSO: 1840/163

UDC 633.13:631.523.4

SELECTION-GENETIC ANALYSIS OF PRODUCTIVITY OF OAT HYBRIDS

Moscow GENETIKA in Russian Vol 21, No 10, Oct 85 (manuscript received 18 Dec 84) pp 1722-1730

[Article by N.A. Kalashnik, V.A. Portyanko and V.I. Bogachkov, Scientific Research Institute of Agriculture, Siberian Department, All-Union Academy of Agricultural Sciences imeni Lenin, Omsk]

[Abstract] A study of the nature of variability, inheritance and combination capacity of 7 varieties of oats and 21 hybrid combinations, obtained by a diallele scheme, is described and discussed. Experiments performed in 1982 and 1983 against a background of average fertility and bare fallow showed the complex nature of variability and heredity of productivity of the oat hybrids. Productivity and grain size of the plants depended upon weather conditions in the vegetation period, the nutritional background and the generation of the hybrids. The significant role of heterosis noted in F_1 hybrids was caused not so much by additive effects as by the genetic system of interaction and this heterosis decreased noticeably in later generations. The nutritional background had less effect in 1983 when the weather conditions were favorable for growth. An increase in the fraction of individual combination capacity and a reduction of common combination capacity occurred in later generations. Analysis of correlations between generations and data concerning analysis of variation series of hybrid combinations showed the effectiveness of selection. The selection period is F_4-F_6 when most of the genotypes are in a homozygous state. Figure 1; references 17: 4 Russian, 13 Western.

2791/9716
CSO: 1840/163

UDC 572.5.576.312

NOVEL APPROACH TO CREATING CHROMOSOMAL LIBRARIES USING X-CHROMOSOME MODEL

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 4, Oct 86 (manuscript received 21 Mar 86) pp 982-984

[Article by M.V. Lavrentyeva, M.I. Rivkin, A.G. Shilov, G.I. Karasik, A.A. Gradov, V.P. Kimarev and O.L. Serov, Institute of Cytology and Genetics, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] A novel approach has been developed for creation of chromosomal libraries or banks, which rests on the use of hybrid somatic cells and screening relying on competitive hybridization. The technical steps specifically cited involved cloning the DNA of hybrid somatic cells derived from the American mink (Mustela vison) and Chinese hamster (X+ cells), carrying a single mink X-chromosome and a complement of hamster chromosomes. Screening consisted of the use of labeled mink DNA and an excess of unlabeled DNA from X- cells (cells lacking the X-chromosome). The X- cell DNA functioned as the competitive reagent preventing cross-reaction of the mink DNA sequences with the DNA of the hamster cells. This approach is marked by its relative simplicity and permits selection of clones carrying the DNA of the mink X-chromosome. Studies with the mink-hamster hybrid cell system led to identification of at least 25% of the clones carrying the X-chromosome DNA. This approach appears to have universal application for the creation of chromosomal banks from various genomes. References 10: 2 Russian, 8 Western.

12172/9716
CSO: 1840/119

UDC 575.173+577.158+633.15

BIOCHEMICAL DESCRIPTION OF INBRED CORN LINES USED IN SOVIET BREEDING PROGRAMS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 4, Oct 86 (manuscript received 10 Apr 86) pp 984-988

[Article by Ye.V. Levites, L.Ye. Monastyreva, F.E. Reymers, corresponding member, USSR Academy of Sciences, and T.B. Sukhorzhevskaya, Institute of Cytology and Genetics, and the Biological Institute, Siberian Department, USSR Academy of Sciences, Novosibirsk; Siberian Institute of Plant Physiology and Biochemistry, Siberian Department, USSR Academy of Sciences, Irkutsk]

[Abstract] Polyacrylamide gel electrophoresis was used to analyze the isozyme patterns of 5 common enzymes to obtain a biochemical description of 31 corn varieties cultivated in the USSR. The biochemical data, reflecting as it does the genotype of the various lines, may be utilized in analyzing the various varieties for their genetic potential in hybridization studies. Data summarized for alcohol, glutamate, succinate and 6-phosphogluconate dehydrogenases and aspartate aminotransferase are presented in tabular form. In a few cases an identical phenotype was encountered, indicating that a wider assortment of

enzymes will be required for more refined and definitive genetic analysis of the corn lines. Figures 1; references 15: 6 Russian, 9 Western.

12172/9716
CSO: 1840/119

UDC 575.11.37

DEMETHYLATION OF rDNA IN BARLEY CALLUS CULTURED IN VITRO

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 5, Oct 86 (manuscript received 15 Apr 86) pp 1249-1252

[Article by Ts.D. Khvyrleva, M.V. Ryzhik, A.K. Gaponenko, A.R. Isakov and A.A. Sozinov, academician, UkrSSR Academy of Sciences and of All-Union Academy of Agricultural Sciences imeni Lenin, Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] Studies were conducted to assess the state of DNA methylation in in vitro culture of barley callus tissue, employing susceptibility to selected restrictases as indication of demethylation. Cleavage studies with HpaII and BamHI restrictases demonstrated that only a part of the HpaII sites were demethylated in the case of rDNA coding for 18 and 28S rRNA, while all of the BamHI sites had undergone demethylation after 1.5 years of in vitro culture. Comparative analysis with the H-family of DNA repeats failed to show demethylation. These observations point to the genetic lability of selected portions of the genome, and may provide an inkling into the mechanisms responsible for the phenomenon of somatoclonal variation. Figures 3; references 13: 1 Russian, 12 Western.

12172/9716
CSO: 1840/121

UDC 575:577.37:576.312

NUCLEAR GENOME ACTIVITY REGULATION AND BIOELECTRIC CHARACTERISTICS OF CHROMATIN AND CELL NUCLEI

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 5, Oct 86 (manuscript received 13 Mar 86) pp 1255-1258

[Article by V.G. Shakhbazov, Yu.G. Shkorbatov and V.Yu. Strashnyuk, Kharkov State University imeni A.M. Gorky]

[Abstract] Microelectrophoretic studies were conducted on chromatin and nuclear preparations obtained from plant, animal and human cells to correlate the functional status with bioelectric properties. A review of the results clearly demonstrated that an increase or a decrease in the synthesis activity of the genetic apparatus was accompanied by an increase or a decrease in the charge of the chromatin or nuclei. Although the mechanisms of such correlation remain enigmatic, there is reason to believe that the activity of the

eukaryotic nucleus may be under nonspecific bioelectrical control. In man, for example, the percentage of buccal epithelial cells with a negative charge changes from 75-80% at age 20-25 years to 10-15% at age 75-80. In connection with the diminished biosynthetic potential of cells on aging, the negative charge is seen to decrease. An immediate application of such an observation is the determination of human biological age. Figures 2; references 15: 12 Russian, 3 Western.

12172/9716
CSO: 1840/121

UDC 579.6

ACINETOBACTER SP. RESISTANCE TO $HgCl_2$

Moscow GENETIKA in Russian Vol 21, No 12, Dec 85 (manuscript received 18 Feb 85; after final revision 25 Apr 85) pp 1945-1952

[Article by O.L. Lomovskaya, S.Z. Mindlin and R.B. Khesin, deceased, Institute of Molecular Genetics, USSR Academy of Sciences, Moscow]

[Abstract] Most of the bacteria found in Khaydarkan mercury deposits are resistant to $HgCl_2$. This resistance could be transmitted by intraspecies crossing and the resistance determinants were localized on plasmids. In this study $HgCl_2$ resistant Acinetobacter sp. strains were characterized. In contrast to Hg-resistant (Hg^r) pseudomonads, the acinetobacter strains were capable of interspecies conjugative crossing, containing both large and small plasmids. This study showed that Hg^r-determinant in acinetobacter was located on relatively small (7.5 kb), nonconjugated plasmids. Consequently, in a single microbiocenosis, the determinants could be located on plasmids differing widely by their structures and properties. The pKL1 restriction map was established; Hg^r determinant region and regions necessary for replication were localized. Figures 4; references 13: 3 Russian (1 by Western author), 10 Western (1 by Russian author).

7813/9716
CSO: 1840/165

UDC 575.591

BIOCHEMICAL POLYMORPHIC SYSTEMS AMONG IMMIGRANT POPULATION IN NORTH-EASTERN USSR. PART 4: GENETIC STRUCTURE CHARACTERISTICS OF INDIVIDUALS WITH CHRONIC PATHOLOGICAL PROCESSES

Moscow GENETIKA in Russian Vol 21, No 12, Dec 85 (manuscript received 22 Jan 85) pp 2049-2056

[Article by L.L. Solovenchuk, Institute of Biological Problems of the North, Far East Scientific Center, USSR Academy of Sciences, Magadan]

[Abstract] It was shown earlier that genetic structure of healthy individuals living under extreme environmental conditions undergoes considerable changes. This study was undertaken because under such conditions the selectivity of genetic structures could also be explained by a number of pathological processes. In all, 2874 individuals with chronic diseases were studied (1261 men and 1587 women) selected at random from the therapeutic-prophylactic institutions of Magadan. Control group consisted of apparently healthy residents (1454 men and 1479 women). Analysis of 14 polymorphic loci was performed. Highly significant differences were noted between healthy and sick individuals whether taken as a group or broken down by sex; this characteristic was stronger among men than women. The study group exhibited lower average degree of heterozygosity in comparison to controls. Thus it was shown that the study group (representing a range of pathological states) differed by the totality of genetic parameters from controls indicating a potential for adaptation and disadaptation process under extreme environmental conditions. References: 11 Russian.

7813/9716
CSO: 1840/165

UDC 575.591:575.174

HLA SYSTEM ANTIGENS DISTRIBUTION AMONG POPULATION OF CARPATHIAN GENOGEOGRAPHIC ZONE OF UkSSR

Moscow GENETIKA in Russian Vol 21, No 21, Dec 85 (manuscript received 22 Oct 84) pp 2044-2048

[Article by L.I. Timoshenko, Ye.N. Bay, N.I. Burka, Zh.N. Minchenko and R.P. Pavlyuk, Kiev Scientific Research Institute of Hematology and Blood Transfusion]

[Abstract] Population-based studies of genetic structure using the distribution of histocompatibility of antigens are important scientific tools in biology and medicine. Those of special interest are HLA system markers because they can be handled mathematically and by genetic analysis. Data were reported on genetic analysis of HLA system histocompatibility antigens among the population of Carpathian genogeographic zone and among the indigenous Ukrainian population of this region. In all 359 individuals were studied, 242 of them were Ukrainians (67.4%). Data characterizing the distribution, gene set and relationship of HLA antigens in A, B and C loci were obtained. These

data are to be used in development of an All Union Bank of "unique typing list of donors" for therapeutic purposes and for bone marrow transplantations. References 8: 7 Russian, 1 Western.

7813/9716
CSO: 1840/165

UDC: 6167.155.194.125

GENETIC HETEROGENEITY AND CLINICAL POLYMORPHISM OF THALASSEMIA IN GEORGIAN SSR POPULATION

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 122, No 2, May 86 (manuscript received 26 Apr 85) pp 377-380

[Article by I.G. Mestiashvili, V.M. Natsvlishvili, M.A. Dolaberidze, Ts.M. Mandzhgaladze, and N.A. Bakuradze, Scientific Research Institute of Hematology and Blood Transfusion imeni G.M. Mukhadze, Georgian SSR Ministry of Health]

[Abstract] A study was made to establish the causes of clinical polymorphism of thalassemia and determine the nature of its genetic heterogeneity in the population of Georgia. Some 455 persons were examined, including patients and their close relatives, predominantly Georgians and Azerbaijanis, but including other groups. The clinical form and genotype were established by morphological, biochemical and clinical-hematologic and family-genetic studies. Thalassemia was found to be a heterogeneous hemoglobinopathy. The broadest clinical polymorphism of thalassemia results from its genetic heterogeneity. The data indicate the necessity to perform precise differential diagnosis of the various forms of thalassemia and establish the genotype, allowing prognosis of the clinical course of the disease, and timely and expedient therapy. References 4: 3 Russian, 1 Western.

6508/9716
CSO: 1840/123

UDC 577.212.3:633.16

CLONING AND CHARACTERIZATION OF RECOMBINANT DNAs CONTAINING REPETITIVE ELEMENTS OF BARLEY GENOME: IDENTIFICATION OF INDIVIDUAL ACTIVELY-TRANSCRIBING REPETITIVE FAMILIES

Moscow GENETIKA in Russian Vol 21, No 11, Nov 85 (manuscript received 18 Dec 84; after final revision 14 Mar 85) pp 1776-1781

[Article by M.I. Prosnyak, N.A. Kartel and A.P. Ryskov, Institute of Genetics and Cytology, BSSR Academy of Sciences, Minsk; Institute of Molecular Biology USSR Academy of Sciences, Moscow]

[Abstract] Molecular-genetic studies of repetitive elements based on recombinant DNA technology make it possible to investigate in plant genome their organizational and functional principles. Data were reported on the cloning

of fragments containing repetitive sequences of barley genome DNA from the waxy line. The clones with actively-transcribing elements were selected by colony hybridization with cDNA on poly(A)+RNA matrix by reverse transcription. Three repetitive families were identified, two of which contained transcriptionally active sequences. Some of these repetitive elements could be used as molecular-genetic markers of genome and chromosomes for genetic mapping of various mutations and plant characterization on the basis of interindividual polymorphism. Figures 5; references 18: 5 Russian, 13 Western.

7813/9716
CSO: 1840/164

UDC 575.127.5:576.312.37

CYTOGENETIC ANALYSIS OF HEXAPLOID TRITICALE FORMS CROSSED WITH COMMON WHEAT HYBRIDS

Moscow GENETIKA in Russian Vol 21, No 11, Nov 85 (manuscript received 5 Mar 85) pp 1869-1876

[Article by Ye.D. Badayeva, N.S. Badayev, N.L. Bolsheva, N.G. Maksimov and A.V. Zelenin, Institute of Molecular Biology, USSR Academy of Sciences, Moscow; All-Union Selection Genetic Institute, All-Union Academy of Agricultural Sciences imeni Lenin, Odessa]

[Abstract] Cytogenetic analysis was carried out of karyotypes from several lines of common wheat hybridized with hexaploid triticale using the method of differential chromosomal staining. Four forms were used: triticale AD 213/5-80 selected in the direction of triticale and three other selected in the direction of common wheat: 381/80, 393/80 and 391/80. All of these forms differed by their chromosome composition. Two forms were stable with 2n=6x=42: AD 213/5-80 and 381/80. In the triticale form a 2D (2R) chromosome substitution was noted. The 381/80 karyotype contained several rye chromosomes formed by translocation of the short arm of IR onto the long arm of IB chromosome. The other two lines were cytologically unstable. It was shown that differential staining could yield additional information in evaluating stability of new forms and in determining genomic and chromosomal structure of their karyotypes. Figures 5; references 21: 6 Russian, 15 Western (1 by Russian authors).

7813/9716
CSO: 1840/164

UDC 575.247.116.12:582.739

INDUCTION OF MITOTIC CROSSING-OVER AND SOMATIC MUTATIONS IN SOYBEANS EXPOSED TO NEUTRONS (0.8MeV) IN COMPARISON TO GAMMA IRRADIATION

Moscow GENETIKA in Russian Vol 21, No 11, Nov 85 (manuscript received 7 Aug 84) pp 1864-1868

[Article by I.D. Davronov and I.A. Zakharov, Samarkand State University imeni Alisher Navoi]

[Abstract] The goal of this study was two-fold: to evaluate the mitotic crossing-over system using heterozygotic soybean plants (by the $Y_{11}y_{11}$ gene) and to use it in studying recombinant and mutagenic action of neutron irradiation. Glycine max. (L.) merril soybean seeds were used, heterozygous to chlorophyl insufficiency gene. Irradiation by 0.8 MeV neutron beam was compared with that by gamma rays from ^{137}Cs; the seeds were stored up to one months prior to seeding. Both types of irradiation induced all types of genetic alterations: direct mutations of nuclear and plasmid nature, reverse mutations and mitotic crossing-over leading to somatic mosaicism in heterozygous plants. Neutron irradiation appeared to be more effective, probably due to their ability to cause dual strand breaks in DNA; its relative biological effectiveness was 6, yielding 22.8 spots per leaf as compared to 0.06 spots per leaf in controls. Figures 2; references 13: 3 Russian, 10 Western.

7813/9716
CSO: 1840/164

UDC 633.11.321:631.523.11:631.524.86

STARTING MATERIAL AND ITS GENETIC BASIS IN SELECTION OF WINTER WHEAT TOWARDS RESISTANCE TO MILDEW UNDER CONDITIONS PREVAILING IN SOUTHERN UKRAINE

Moscow GENETIKA in Russian Vol 21, No 11, Nov 85 (manuscript received 6 Aug 84) pp 1877-1885

[Article by L.T. Babayants, S.Ts. Smilyanets and A.F. Stelmakh, All-Union Selection-Genetic Institute, Odessa]

[Abstract] The goal of this work was to investigate by hybridologic analysis genetic resistance of various sorts and forms of common winter wheat towards mildew at different stages of plant oncogenesis. It was shown that the resistance to mildew depends on a complex gene system, some of which are independent and some dependent on each other. Some genes determine the type and intensity of the damage while others relate only to intensity. A number of donors was listed which could be used in development of mildew-resistant lines. References 30: 4 Russian, 26 Western.

7813/9716
CSO: 1840/164

ANTIGEN SPECIFIC TRANSFER FACTOR FROM MICE IMMUNIZED WITH ATTENUATED FLAVIVIRUS: INTENSIFICATION OF INDUCING ACTIVITY IN SEMIPURIFIED SPLENOCYTE DIALYSATES

Bratislava ACTA VIROLOGICA in Russian Vol 29, No 1, Jan 85 (manuscript received 22 Jun 84) pp 25-34

[Article by V. Mayer, E. Gajdosova, M. Valaskova and C. Oravec, Institute of Virology, Slovak Academy of Sciences, Bratislava; Combined Center of Viral Studies at Infectious and Parasitic Diseases Clinic, Medical Faculty of the Ya. A. Komenski University, Bratislava; Institute of Experimental Oncology, Slovak Academy of Sciences, Bratislava]

[Abstract] An attempt was made to intensify antigen specific activity of transfer factor (TF) by a complex procedure involving ethanol precipitation of lysed leucocyte dialysate (LLD) and gel filtration. Data were reported on purification from protein and "non-TF" admixtures, on composition of a similar semipurified product and its inductive activity. Three fractions of the dialysate were obtained from SPF mice immunized with live attenuated tick encephalitis virus yielding 1.73 g of dried material. The activity ranged from $2 \cdot 10^5$ to $2 \cdot 10^3$ TF units per mg of the test material. After purification, the final product contained 3.7% of the dry mass of starting material. While the protein content and content of the material reacting with orcein dropped to 80 and 37% respectively, the antigen specific inducing ability increased by 2-3 log units. Thus it was shown that macromolecules with inducing activity may be effectively separated from other components and that the increase in antigen specific inducing activity titer was caused by removal of suppressor or inhibiting factor present in the impure dialysates. References 19: 6 Russian (6 by Western authors), 13 Western.

7813/9716
CSO: 1840/182

UDC 615.339:578.245].011

PHYSICAL-CHEMICAL AND BIOLOGICAL PROPERTIES OF HUMAN PLACENTARY AMNIOTIC INTERFERON

Moscow VOPROSY VIRUSOLOGII in Russian, Vol 30, No 6, Nov-Dec 85 (manuscript received 4 Mar 85) pp 693-697

[Article by V. I. Bakhutashvili, D.G. Merabishvili, R.V. Gogitashvili, B.M. Korsantiya, L.L. Dzotsenidze, L.B. Kartoziya, O.G. Andzhaparidze, V.P. Kuznetsov and D.K. Mkervalishvili, Institute of Experimental Morphology, Georgian SSR Academy of Sciences, Tbilisi]

[Abstract] A human placental homogenate was used in experiments on induction of interferon. Induction of interferon in the placenta, cultivation of the tissue, isolation and purification of the preparation yielded a product which the authors call "Plaferon." The anti-viral activity of plaferon in primary human embryo fibroblasts was 2500-5000 units/ml. The interferon did not dialyze through a semipermeable membrane, was sensitive to trypsin, heating to 70°C for 15 minutes, but insensitive to RNAase, DNAase and lipase, and little sensitive to mechanical stress. It was stable at pH 2.0 $\pm$ 0.2, and the initial titer was maintained after lyophilic drying. The toxicity of the substance was studied, indicating that it had no cytotoxic effect on cell cultures. The method can be used to produce large quantities of highly active interferon from the amniotic shell of the human placenta. References 10: 7 Russian, 3 Western.

6508/9716
CSO: 1840/176

UDC 616.831-002-022:578.833.26]092.9-085.339:578.245.2

COMPARATIVE STUDY OF ANTIVIRAL ACTIVITY OF NATURAL DOUBLE-STRANDED RNA IN EXPERIMENTAL TICK-BORNE ENCEPHALITIS

Moscow VOPROSY VIRUSOLOGII in Russian Vol 30, No 6, Nov-Dec 85 (manuscript received 29 Apr 85) pp 697-700

[Article by M. Yu. Knoroz, O.M. Popova, A.A. Davydova, N.N. Nosik, I.F. Barinskiy, V.P. Podgornyy and Yu.S. Alikin, Institute of Virology imeni D.I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Experiments on mice were used to study the comparative effectiveness of three natural interferon inductors, double-stranded RNA of the phages f_2, φ_6 and yeast two-strand plasmid RNA. The preventive and therapeutic effect of these preparations was studied. Determination was made of the preventive and therapeutic activity of interferon inductors in combination with commercial tick-borne encephalitis vaccine. Results obtained in experiments involving administration of the inductors to non-immune mice indicated the higher antiviral activity of the yeast double-strand RNA in therapy. This interferon inductor was therefore selected for the study of the combined

effect with specific vaccine. The results of these experiments confirmed the promise of this therapy; and protective qualities were indicated. References 6 (Russian).

6508/9716
CSO: 1840/176

UDC 616.98:578.833.26]-078.73

SEROLOGIC CHARACTERISTICS OF KAMA-51 MONOCLONAL ANTIBODIES TO TICK-BORNE ENCEPHALITIS VIRUS

Moscow VOPROSY VIRUSOLOGII in Russian Vol 30, No 6, Nov-Dec 85 (manuscript received 20 Mar 85) pp 704-707

[Article by S. Ya. Gaydamovich, Ye. E. Metnikova, A. S. Novokhatskiy, A. A. Kushch, N. A. Sveshnikova, Z. N. Krasnobayeva, I.V. Malakhova and V. M. Zhdanov, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] The serologic characteristics of the KAMA-51 monoclonal antibody were studied in reactions with tick-borne encephalitis complex viruses. The KAMA-51 clone in culture produced antibodies in the culture fluid at a titer of 1:16-1:32, sometimes 1:64, and antibody production in reclones was 1-2 dilutions higher than in the uncloned line. The antibodies were found to react only in the indirect immunofluorescence test, not in the CFT test or neutralization reaction. The antibody is in the IgG class. Due to the group-specific activity of the KAMA-51 monoclonal antibody, it can be used for group indication of all tick-borne encephalitis complex viruses and for their differentiation from other flaviviruses. Figure 1; references 13: 4 Russian, 9 Western.

6508/9716
CSO: 1840/176

BRIEFS

RAPID TEST FOR HUMAN HEAT TOLERANCE--(Donetsk)--A blood sample as little as a drop is enough to determine, over a few minutes, people's ability to work under conditions of high temperatures without damage to their health. Scientists at the Donetsk Scientific Research Institute of Labor Hygiene and Occupational Diseases have proposed a new quick test based on thermal hemolysis of erythrocytes to determine the bodily heat resistance. This method not only furthers more reliable screening of personnel for work as deep-bed coal miners, metallurgists, chemists, bakers and others occupationally exposed to higher temperatures, but also, in an extremely short time determines the ability of unprepared people to accomplish work in emergency situations. Today, the method is more reliable and effective than conducting research in thermal chambers or special suits. Application of the new method in conjunction with the previous method, opens up extensive possibilities in the search for effective means of adaptation for people exposed to extreme conditions. The innovation was adopted by the Oblast Clinic of Work-Related Diseases and by several medical institutions servicing coal miners. [By I. Dyachkova] [Text] [Kiev ROBACHAYA GAZETA in Russian 13 Oct 86 p 2]

9716
CSO: 1840/133

UDC 577.3:581.48.035.1

EFFECTS OF LASER RADIATION ON SEEDS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 86 (manuscript received 31 Oct 85) pp 27-30

[Article by T.K. Gordiyenko, V.R. Kononchuk, V.D. Kuchin, Yu.I. Posudin and A.D. Suprun, Chair of Physics, Ukrainian Agricultural Academy]

[Abstract] In view of reports, some contested, that laser irradiation of crop seeds promotes germination and enhances yields, a statistical evaluation was conducted on the effects of three laser modalities on Bila Tserkva sugar beet seeds. The seeds were irradiated either with concentrated white light, helium-neon laser emitting at 633 nm, or with monochromatic light obtained via a 633 nm interference filter. Relying on Fisher criteria with a 5% confidence limit, the data demonstrated unequivocally that laser radiation of the type under study failed to enhance germination of sugar beet seeds. These findings do not detract, however, from the use of lasers in studies on photobiological processes in plants. Figures 1; references 11 (Russian).

12172/9716
CSO: 1840/127

MEDICINE

COMPUTER-AIDED SURGERY IN USSR

Moscow TASS in English 23 Oct 86

[Text] A computerized tomograph, which for the first time showed on the screen an x-ray picture of the pancreas, gave Soviet surgeons a new idea of dealing with cysts and abscesses without surgery--or at least without conventional complex operations.

A thin catheter is introduced with tomograph control through the skin directly into the affected part of the pancreas. The contents of the cyst are removed through the catheter, the cavity is washed and medicine or special "filling" introduced to avoid the recurrence of the affliction. The whole operation takes only half an hour. The first operations of this type were performed at Moscow's Vishnevskiy Institute of Surgery. Cysts of the liver have begun to be treated in this way as well.

Clinical results indicate that the new method shows good promise, TASS was told by Academician Mikhail Kuzin, the institute's director, on whose initiative this work had been introduced. Surgeons willingly lay aside their knives in favor of the method which is far less traumatic and virtually bloodless. Another forceful argument in its favor is prompt effect. While surgery for a liver abscess lays the patient up for several months, the new method confines him to bed for only three to four weeks.

Moscow surgeons have tested tomograph-controlled treatment of the spleen, kidneys and other organs, Kuzin believes that such operations will be performed under the control of ultrasonic echography in the future.

/9716
CSO: 1840/134

UDC 616.831-005-084-073.43:534-8

DEVICES AND DIAGNOSTIC CAPABILITIES FOR ULTRASONIC DOPPLEROGRAPHY OF CEREBRAL VESSELS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 7, Jul 86 (manuscript received 3 Jan 86) pp 91-98

[Article by G. I. Eninya, V. Kh. Robule and O.S. Kosyaks, Riga Medical Institute]

[Abstract] Early diagnosis of cerebral vascular insufficiency requires simple and inexpensive, noninvasive methods of studying the cerebral blood vessels. Ultrasonic diagnostic methods, including ultrasonic dopplerography, can satisfy this need, but this will require domestic series production of suitable diagnostic apparatus, superior to the IPK-1 blood flow indicator now produced. This article describes the medical and technical characteristics of small devices which have been created for ultrasonic dopplerography of the cerebral vessels, including the portable "DIA-1" and "DIA-2" ultrasonic dopplerographs, developed by the authors. Clinical testing indicated that the "DIA-2" can produce good quality dopplerograms allowing diagnosis of regional specifics of circulation in the carotid artery and vertebral arteries. The devices, producing an audible indication of circulation in the cerebral vessels, are suitable for use in initial screening of the population. Figures 4; references 8: 7 Russian, 1 Western.

6508/9716
CSO: 1840/122

UDC 617-001.4-002.3-085.355:577.152.344.015.2:618.8

PHYSIOLOGICAL CHARACTERISTICS OF DIADYNAMOPHORESIS OF PAPAINE

Yerevan DOKLADY AKADEMII NAUK ARMYANSKOY SSR in Russian Vol 82, No 5, pp 228-231

[Article by L.A. Matinyan, Kh. O. Nagapetyan, S.S. Amiryan, V.S. Mirzoyan, Sh. V. Grigoryan and S.R. Mkrtchyan, Institute of Physiology imeni Academikom L. A. Orbeli, Armenian SSR Academy of Sciences]

[Abstract] The use of individual or combined animal, microbial and vegetable enzyme preparations to influence processes of restoration of damaged tissue has been extensively studied. Enzymes from the plant carica papaya, including papaine, chemopapaine, leucozyme and leucopaine, have been widely used in recent years. Methods of phoresis of medicinal preparations, including enzymes, by means of diadynamic currents, have been widely developed recently. Considering the properties of papaine and the fact that the literature contains no work on its application with diadynamic currents, the authors undertook a physical-chemical study of the influence of diadynamic currents on the pharmacological activity of papaine and its depth of penetration through the upper layers of the skin in intact animals. Two special applications wet with a 0.5% solution of freshly prepared papaine were placed in the interscapular area of guinea pigs, and a 5mA short-period modulated current was applied through lead electrodes. The current caused the papaine to penetrate into the skin of the intact guinea pigs, and sufficient quantities of the substance were detected at depths of up to 2 mm or more. The advantages of the method include simplicity, the ability to create maximum papaine concentration directly in the pathologic focus and the absence of any side effects. Figure 1, references 18: 16 Russian, 2 Western.

6508/9716
CSO: 1840/145

MEDICAL ENGINEERING ADVANCEMENTS AT SARATOV INSTITUTE

Moscow PRAVDA in Russian 31 Oct 86 p 3

[Article entitled "Engineer is Physician's Ally" by N. Ivanov, rector, Saratov Medical Institute, corresponding member, USSR Academy of Medical Sciences]

[Abstract] Medical engineering advancements described in the article included discussion of a laser laboratory at the Saratov Department of Elective Surgery, where the stimulation of tissue regeneration by low-intensity laser emission has been demonstrated. Laser therapy is being used here to treat slow-healing wounds, trophic ulcers, non-knitting bone fractures and inflammatory diseases. Physicans and engineers here collaborated in development of one of the country's first laser devices to be used in treatment of these diseases; series production has begun and the equipment has been used successfully in thousands of operations. Use of lasers in gastro-intestinal surgery in treatment of ulcers and cancer has permitted bloodless surgery with 3-fold

reduction in the number of complications. Lasers are being used in liver and spleen surgery. Department of Ophthalmology, Interoblast Laser Center associates and university engineers have introduced devices combining lasers, a variable magnetic field and ultrasound to be used to treat eye diseases. Institute hygienists and Moscow Scientific Research Institute of Plastics associates have developed new polymer materials to be used to make high-efficiency water purifiers, the use of which along the Volga has had an economic impact of more than 1 million rubles. Joint efforts of physicians, engineers and chemists have completely eliminated acute poisonings and chronic intoxications at the Nitron Production Association while industrial diseases have been reduced 5-fold at the Balakovskiy Production Association, Khimvolokno, in the current five-year period. University personnel and production engineers have developed the Volna complex (now in series production), used to transmit EKG's to a distant diagnostics center for interpretation by specialists. Associates of the facultative surgery clinic and the university computer center have developed principles of mathematical modelling of surgical diseases, the use of which provides precise differential diagnoses and prognoses. Computers are being used at the Department of Propaedeutics of Internal Disease to create a memory bank which provides data concerning patients with cardiovascular diseases. Artificial joint replacements have been performed here for almost 20 years and more than 40 authors' certificates and 6 patents for equipment used in such surgery have been granted in USA, England, France and other countries. More than 80 percent of the patients receiving such prostheses return to work. Obstacles to further improvement of medical procedures and medical engineering advancements were discussed.

2791/9716
CSO: 1840/136

UDC 576.8.0,95.23.4

DESULFUROCOCCUS AMYLOLYTICUS N.SP.: NEW SPECIES OF EXTREMELY THERMOPHILIC ARCHAEBACTERIUM FROM THERMAL SPRINGS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 5, Oct 86 (manuscript received 29 Jan 86) pp 1259-1263

[Article by Ye.A. Bonch-Osmolovskaya, A.I. Slesarev, M.L. Miroshnichenko and T.P. Svetlichnaya, Institute of Microbiology, USSR Academy of Sciences, Moscow]

[Abstract] A novel species of highly thermophilic bacterium has been isolated from the thermal springs on Kamchatka peninsula and Kunashir Island, and subjected to bacteriological studies. The microorganism, designated Desulfurococcus amylolyticus, belongs to the Archaebacteria, grows well in a temperature range of 68-97°C with an optimum temperature of 92°C. Growth occurs within a pH range of 5.7 to 7.5, with a pH optimum of 6.4, and a generation time under optimal conditions of 50 min to a biomass density of 2×10^9 cells/ml. The cells are coccoid in shape, 0.7-1.5 μm in diameter, and utilize peptides, amino acids, starch, glycogen, and pectin. In the presence of molecular sulfur they form hydrogen sulfide. The GC content of the DNA is 41.2 mole%. Growth is completely inhibited by 0.2% NaCl, and the cell wall is lysed by 0.1 mM sodium dodecylsulfate, suggesting the protein nature of D. amylolyticus cell wall. Figures 2; references 9: 1 Russian, 8 Western.

12172/9716
CSO: 1840/121

UDC 578.085.23:576.07

CONTAMINATION OF CELL CULTURES WITH MYCOPLASMAS: METHODS OF DETECTING AND POSSIBLE MEANS OF SPREADING OF MYCOPLASMA INFECTION

Leningrad TSITOLOGIYA in Russian Vol 27, No 3, Mar 85 (manuscript received 15 Dec 83) pp 276-281

[Article by T. D. Smirnova and I.I. Fridlanskaya, Institute of Cytology, USSR Academy of Sciences, Leningrad]

[Abstract] The purpose of this work was to determine the necessary combination of methods required to detect mycoplasmas and produce experimental proof of one of the most widespread methods of cell contamination, infection in the laboratory. Methods of detection included a microbiological method, method of staining and method of autoradiography. The results indicate that all three methods must be used to obtain final and reliable answers concerning the presence of mycoplasmas in a cell lines. The method of autoradiography is particularly irreplaceable in studies of cell lines which have been treated with antibiotics. The experiments demonstrate that pure cell lines can be contaminated easily during transplantation in the laboratory. Simple methods which prevent contact of contaminated cell lines with pure cell lines and the media used for transplantation can prevent this contamination. References 34 (Western).

6508/9716
CSO: 1840/1000

UDC 616-005.1-036.17-085.384.015.2:615.835.12]-07:
616-008.922.1-07

BODY OXYGEN STATUS IN REPLACEMENT OF ACUTE BLOOD LOSS BY DEXTRAN (POLYGLUCIN) IN NORMO- AND HYPEROXIC CONDITIONS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian
No 5, Sep-Oct 85 (manuscript received 5 Dec 84) pp 40-44

[Article by V.S. Yarochkin, O.P. Volos and N.M. Turkevich, Laboratory of Pathological Physiology, Central Scientific Research Institute of Hematology and Blood Transfusion, USSR Ministry of Health, Moscow]

[Abstract] The effects of pure oxygen breathing on tissue oxygenation was assessed in dogs with moderate blood loss (40 ml/kg) and dextran replacement to determine the potential clinical implications. Evaluation of the hemodynamic paramaters and blood gases demonstrated that pure oxygen breathing was contraindicated because of deleterious effects on tissue oxygenation in such conditions. Elevation of the venous partial pressure of oxygen to ca. 89 mm Hg had an adverse effect on the efficiency of gas exchange, since exchange involved only the physically dissolved oxygen in the venous blood, a process 7-fold less efficient than the delivery of oxygen by erythrocytes. Under the circumstances, the erythrocytes failed to deliver their oxygen because of the S-shaped dissociation curve for oxyhemoglobin which requires a venous partial pressure of oxygen of 45-50 mmHg for release of oxygen to the tissues. Consequently, pure oxygen inhalation is contraindicated in blood loss since it leads to acute oxygen starvation. Figures 4; references 8: 6 Russian, 2 Western.

12172/9716
CSO: 1840/159

RESEARCH IN TRANSPORT RNA FUNCTION

Kiev PRAVDA UKRAINY in Russian 24 Sep 86 p 4

[Article by A. Mirzabekov, USSR State Prize Laureate, corresponding member, USSR Academy of Sciences, director, Institute of Molecular Biology, USSR Academy of Sciences]

[Abstract] Scientists at the Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, are studying transport RNA to determine how it works, the specifics of its functioning in various physiological and pathologic bodily states related to changes in the level of protein biosynthesis in the cell, and how it functions under extreme conditions such as hypoxia or cold. The search for answers to these and other questions has required great effort and more than 20 years of work. The results of these studies, published as "structural-functional principles of the participation of transport RNA in aminoacyl tRNA synthesis in the regulation of biosynthesis of protein at the translation level in animals" has been submitted in the competition for the Ukrainian SSR state prize.

6508/9716
CSO: 1840/100

UDC: 577-612.014.426-112

EFFECT OF 'MAGNETIZED' SALINE SOLUTION ON NUMBER OF LEUKOCYTES IN GUINEA PIGS

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 122, No 2, May 86 (manuscript received 31 May 84) pp 385-388

[Article by M.A. Bregadze, Institute of Physiology imeni I.S. Beritashvili, Georgian SSR Academy of Sciences]

[Abstract] Experiments were performed on 60 mature guinea pigs of both sexes to determine the influence of magnetized saline solution on the number of leukocytes in the blood. For ten days, the animals received magnetized saline solution, 10 ml i/v. The experiments established that 1-time and repeated introduction of saline solution treated with a constant magnetic field of 300 Oe/5 minutes did not cause death of the animals but did have an effect on the peripheral blood cells similar to the effect of a magnetic field itself: leukocytosis (maximum increase from initial level 40-60%) followed by leukopenia (number of leukocytes decreased by 20-30%). Figures 3, references 3: Russian.

6508/9716
CSO: 1840/123

UDC 615.917:547.241].015.25.074:543.42.062

ULTRAVIOLET SPECTROMETRIC ANALYSIS OF ISONITROSINE

Moscow FARMATSIYA in Russian No 4, Jul-Aug 85 (manuscript received 20 Oct 84) pp 37-38

[Article by Yu.A. Yershov, L.Ye. Priyezzheva and R.I. Kurashova, First Moscow Medical Institute imeni I.M. Sechenov]

[Text] Isonitrosine (dimethylamino-2-isonitrosobutanone-3-hydrochloride) is used in medical practice for treatment of poisonings by organophosphorus compounds (FOS). The mechanism of activity of isonitrosine, a cholinesterase reactivator, is based on its competitive interaction with organophosphorus compounds (1-6).

A color reaction with dithizon has been suggested for qualitative detection of isonitrosine in solution (7). Among methods for the quantitative assay of isonitrosine, the literature has described a hydroxylamine assay method, a nonaqueous titration method, and an argentometric analysis method (the assay in this case is not carried out on the pharmacologically active part of the molecule) (1).

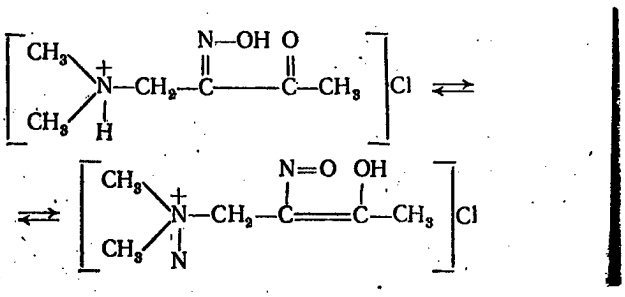
We have investigated the feasibility of quantitative assay of isonitrosine using an ultraviolet spectroscopy method, and, in doing so, we have studied the isonitrosine's spectral characteristics as a function of the nature of the solvents.

Experimental Section

Two maxima in the ultraviolet spectra of isonitrosine in aqueous solutions have been detected. The first, at 228 nm ($\varepsilon \approx 12{,}000$), is more intensive and the second, at 279 nm ($\varepsilon \approx 2{,}500$), is less intensive.

The absorption band with a 228 nm maximum was chosen for quantitative assay of isonitrosine. The range of concentrations in which linear dependence of the optical density magnitude on isonitrosine concentration is retained is 10^{-4}-10^{-5} mole/liter.

The first maximum at 228 nm can be linked to $\pi \rightarrow \pi^*$ and $n \rightarrow \sigma^*$ electron transition, which results from the presence of a carbonyl group in the molecule. The second maximum can be linked to the presence of a nitroso group in the molecule (through tautomerism) and to $n \rightarrow \pi^*$ type transition caused by electrons of unshared pairs both of an atom of nitrogen and an atom of oxygen. The data obtained from research on isonitrosine spectra in saline and alkaline solutions verifies the hypothesis about the presence of tautomerism:



The HCl solutions (pH 1.0-2.0), isonitrosine has only one clear-cut maximum at 229 nm ($\varepsilon \approx$ 13,200), which can be attributed to tautomerism in the carbonyl configuration.

As with the hydrochloric acid solutions, only one clear-cut absorption maximum at 281 nm ($\varepsilon \approx$ 22,000) has been detected in the ultraviolet spectra of isonitrosine in a sodium hydroxide solution (pH 10.0-13.0). This maximum can be attributed to tautomerism in the nitroso configuration. Isosbestic points have been noted in isonitrosine's ultraviolet spectra at various pH values of the medium. Existence of isosbestic points in a system under review is known to indicate the presence of a chemical equilibrium between two agents. This fact is additional confirmation of the validity of assuming the presence of tautomeric conversions in the system in question.

(1) Результаты количественного УФ-спектрофотометрического анализа изонитрозина в 40% растворе для инъекций (n=6)

(2) Растворитель	$\bar{x} \pm \varepsilon_\alpha$, %; n=6
(3) H_2O дистиллированная	39,3±0,8
0,01 н, HCl	39,0±0,7
0,01 н, NaOH	38,8±0,8

Key:
1. Results of quantitative ultraviolet spectrometric analysis of isonitrosine in a 40 percent injection solution (n=6).
2. Solvent
3. Distilled water

The results of our research indicated that water, 0.01N HCl and 0.01N NaOH can be used as solvents for quantitative spectrometric analysis of isonitrosine. Water was chosen for the working solvent (as the most available and universal solvent).

Procedure. We put 5 ml of a 40 percent isonitrosine injection solution into a 500-ml graduated flask, brought the volume of the solution up to the mark with water and stirred it. We put 5 ml of the solution obtained into a 200 ml graduated flask, brought the volume of the solution up to the mark with water and stirred it. We measured the optical density of the solution obtained at 228 nm, in a cell with a 10 mm layer-thickness, using water as a reference solution. As the standard, we used isonitrosine, which meets requirements for normative-technical specifications.

The relative error of the assay does not exceed $\pm$ 2.3 percent (see table). The main advantages of the ultraviolet spectrophotometric method of isonitrosine analysis, compared to existing procedures (argentometric and nonaqueous titration), are its great selectivity, lower labor intensiveness, and speed of the analytical procedure.

Conclusions

1. The spectral characteristics of isonitrosine in the ultraviolet range depend substantially on the nature of the solvents and the pH of the medium. Optimal conditions for carrying out the analysis have been chosen.

2. The presence of tautomeric conversions in the system under investigation has been established.

3. A procedure for quantitative ultraviolet spectrophotometric assay of isonitrosine in injection solutions is proposed.

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12976/9716
CSO: 1840/091

UDC 597.583.1-105:574.64:632.95

EFFECTS OF CHLOROPHOS ON BRAIN LEVELS OF ACETYLCHOLINESTERASE IN PERCH (PERCA FLUVIATILIS)

Kiev GIDROBIOLOGICHESKIY ZHURNAL in Russian Vol 21, No 5, Sep-Oct 85 (manuscript received 11 Dec 81) pp 49-53

[Article by V.I. Kozlovskaya and G.M. Chuyko, Institute of Biology of Inland Waters, USSR Academy of Sciences, Borok]

[Abstract] In order to provide further confirmation for the utility of fish-brain acetylcholinesterase (AChE) as a biochemical indicator of water pollution with organophosphorus pesticides, the effects of chlorophos (80% 0,0-dimethyl-2,2,2-trichlorooxyethylphosphone) were assessed on AChE activity in perch (Perca fluviatilis) brain. Addition of chlorophos, to a concentration of 5 mg/liter, resulted in rapid onset of symptomatology, terminating in death of 50% of the fish in 8 h, with AChE depressed by 79% on the average. The remaining fish died between 8 and 24 h with depression approaching 92% of baseline activity. A concentration of 0.62 mg/liter of chlorophos led to a death rate of 50% within 48 h. A dose of 0.12 mg/liter of chlorophos did not lead to detectable signs of intoxication. However, within 24 h, AChE activity fell by 13%, and within 5 days by 33%. Fish, maintained in the same water with addition of 0.12 mg/liter chlorophos once per 5 days, died when the total concentration reached 0.36 mg/liter, with a concomitant depression of brain AChE activity by 70-75%. These observations confirmed the utility of brain AChE as a sensitive indicator of intoxication with organophosphorus pesticides, as well as the fact that the effects are cumulative and that death occurs when enzymatic activity falls to 70-79% of the baseline level. Figures 5; references 13: 3 Russian, 10 Western.

12172/9716
CSO: 1840/2207

ENTEROFAR--NATURALLY-OCCURRING PROTECTIVE AGENT AGAINST FOOD TOXINS

Vilnius SOVETSKAYA LITVA in Russian 27 Nov 86 p 2

[Article by V. Mikhaylov]

[Abstract] Professor Yu. Rafes from the Dnepropetrovsk Institute of Gastroenterology proposed a hypothesis that there should be substances in the human gastrointestinal tract which could protect it from harmful agents in foodstuffs. In any organism this is usually achieved by protective peptides whose deficiency often results in gastrointestinal disorders and diseases. In cooperation with G. Dudenas from Kaunas Experimental-Production Plant "Sanitas" Rafes attempted to isolate such a protector. Coworkers at "Sanitas" I. Grinyavichyus and M. Povilonis produced such an agent from pig duodenum and called it "Enterofar". When tested on animals, Enterofar protected them against dyspepsia about 3.5 fold better than other traditional agents: the death of animals decreased and their productivity increased at a much reduced treatment cost. This agent is produced now commercially but on a limited scale. Technical specifications were developed for it recently and soon other plants will be able to mass-produce it.

7813/9716
CSO: 1840/211

DERIVATIVES OF BENZO(s)FLUORENE. PART 6: ANTIVIRAL AND INTERFERON INDUCING ACTIVITIES IN MICE AFTER ADMINISTRATION OF THREE BENZO(s)FLUORENONE DERIVATIVES

Bratislava ACTA VIROLOGICA in Russian Vol 29, No 1, Jan 85 (manuscript received 16 Aug 84) pp 11-18

[Article by F. Smejkal, D. Zelena, J. Krepelka and I. Vancurova, Scientific Research Institute of Pharmacology and Biochemistry, Prague, Czechoslovakia]

[Abstract] Tiloran (bis-diethylaminoethylfluorenone) is the first synthetic compound capable of inducing high levels of interferon (IF) in mice. High toxicity prevents its use in treating viral infections in humans. A number of benzo(s)fluorenone derivatives (R= 5-(2-diethylamino)ethoxy]-6-[2-diethylamino)-ethoxycarbonyl] was studied in a search for less toxic agents: 3,9-R-7-oxo-7H-benzo(s) fluorene hydrochloride (I), R-7-oxo-7H-benzo(s)fluorene dihydrochloride (II), R-7-oxobenzo(s)fluorene (III) and tiloran as the control agent. Experiments were done on mice looking for activity against smallpox and encephalomyocarditis virus. All three of the tested compounds were effective by oral or sc administration. The highest activity, comparable to that of tiloran, was shown by III with much lower toxicity. III and II induced production of IF on a level comparable to tiloran. The antiviral activity of I had to be based on some other mechanism as it did not induce production of IF. Figure 1; references: 19 Western.

7813/9716
CSO: 1840/182

UDC 616.891-092.9-07:616.831.41-018.82-02:615.256.54

EFFECTS OF OXYTOCIN ON ANTERIOR HYPOTHALAMIC NEURONS IN RATS WITH INDUCED NEUROSIS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 85 (manuscript received 11 Jan 84) pp 30-32

[Article by M.M. Rasulov, Department of Adaptation Pharmacology, Scientific Research Institute for Biological Testing of Chemical Compounds, Moscow]

[Abstract] To further define the mechanism of action of the therapeutic efficacy of oxytocin in treating clinical neurosis, electrophysiological studies were conducted on the effects of oxytocin on anterior hypothalamic neurons in Wistar rats with a neurotic condition induced by sexual deprivation. The resultant statistical analysis of the discharge patterns in control rats and neurotic rats treated intravenously with either 1 or 5 IU/kg of oxytocin revealed dose-dependent changes in baseline discharge parameters. With the 1 IU/kg dose the range of changes in activity for the various cells varied from 35 to 250%, and, with the 5 IU/kg dose, from 60-400%. These observations demonstrated the presence of oxytocin receptors on anterior hypothalamic neurons, as well as the fact that experimental neurosis modified their responsiveness to exogenous oxytocin. The discharge parameters were marked by greater dispersion values in the experimental animals, as well as by higher variation and asymmetry coefficients. References 9: 5 Russian, 4 Western.

12172/9716
CSO: 1840/159

UDC 616.127-005.8-07:616.15-073.432.19-074:535.37]-092.9

SONOLUMINESCENCE LEVEL OF ARTERIAL AND VENOUS BLOOD PLASMA IN EXPERIMENTAL MYOCARDIAL INFARCTION

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 1, Jan-Feb 85 (manuscript received 8 Dec 83) pp 15-18

[Article by T.A. Adzhimolayev, Sh.E. Atakhanov, O.I. Aleshin, R.V. Medvedeva, O.A. Krylov, L.F. Nikolayeva, K.F. Belyakov and I.Ye. Galakhov, Institute of Normal Physiology imeni P.K. Anokhin, USSR Academy of Medical Sciences; Central Scientific Research Institute of Health Resort Science and Physiotherapy, USSR Ministry of Health; All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Experimental myocardial infarcation was induced in 10 male dogs (weight 10-28 kg) by tightening ligatures laced under the left coronary artery after closing the chest wall. These ligatures were not tightened in 4 control dogs. Experiments continued for 13 hours. EKG data and histological study of the myocardium confirmed development of myocardial infarction. Blood used to measure plasma sonoluminescence was drawn via a catheter from the ascending aorta (arterial- A), from the lower vena cava (venous-V) and from the great cardiac vein (flowing predominantly from the left ventricle-S). Blood from these areas was drawn 1 hour after occlusion of the coronary arteries and each 3 hours thereafter until completion of the experiment. Control dogs' sonoluminescence level of blood from these areas did not change significantly during the experiment. The highest sonoluminescence level was recorded in plasma from the great cardiac vein and the lowest was recorded in arterial blood plasma. Sonoluminescence intensity followed the sequence S>V>A. Significant changes of sonoluminescence intensity occurred in blood from all 3 areas, in experimental dogs and the sonoluminesce intensity ratio S>V>A was maintained in all periods of observation. The assumption that sonoluminescence intensity increase is caused by necrobiotic processes ensuing in the immediate focus of infarction was confirmed by the absence of significant changes of blood plasma sonoluminescence level in control dogs, by the highest rates of plasma sonoluminescence in blood from the infarcted myocardium and by mathematical expression of curves of change of luminescence intensity in venous blood plasma and in that from the great cardiac vein which may be described as a function of the time of infarction. The possible role of the lungs in changes of free radical processes after myocardial infarction is mentioned briefly. Figures 2; references 9: 8 Russian, 1 Western.

UDC 612.821.6+612.821.7+612.822.3

INFORMATION RECALL FEATURES IN HUMAN STAGE 2 SLEEP

Moscow BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 86 (manuscript received 30 Jan 85) pp 61-64

[Article by Ye.K. Arons, V.M. Vasilyeva and A.A. Tiunova, Chair of Physiology of Higher Nervous Activity, Moscow State University imeni M.V. Lomonosov]

[Abstract] EEG, EMG and EOG monitoring was conducted on a total of 31 subjects (average age 20 years) to assess information processing in the 2nd stage of sleep. Testing consisted of verbal presentation of paired numbers, with command to clench the right fist if the second number is smaller in value than the first (e.g., 6 - 2, 6 - 8, etc.). Training was conducted prior to the sleep phase in the wakeful state. EEG responses in the 2nd sleep stage did not correspond to those recorded during wakefulness, but represented the numerical values of the numbers used in testing (5 - 3, 5 - 7, 5 alone). The data were interpreted to indicate that inter gative cerebral function during sleep permits appropriate responses only in situations where there is a normal and expected automatic transition from a smaller to a larger number. The 'sleeping' brain perceives the larger (in value) number as a more powerful stimulus and overrides any commands. Figures 1; references 10: 5 Russian, 5 Western.

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CSO: 1840/127

UDC 577.362.5:594.181

BARIUM CURRENT THROUGH CALCIUM CHANNELS IN NERVE CELL MEMBRANE OF MOLLUSCS: 'INACTIVATION' OF CHANNELS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 12, Dec 85 (manuscript received 23 May 85) pp 1181-1189

[Article by P. G. Kostyuk, A. Ye. Martynyuk and P. A. Doroshenko, Institute of Physiology imeni A. A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Studies were performed on isolated intracellular perfused neurons of the small Helix pomatia. It was found that, with potentials maintained close to the rest potential, the amplitude of the barium current through potential-activated calcium channels decreases rapidly, reaching a steady value of 10 to 30% of the initial value in 2 to 3 minutes. The experiments were performed on isolated, unidentified neurons of Helix pomatia, by a method described in an earlier work. The unusual behavior of the barium current was confirmed in studies on intact, nonperfused cells without recording of the membrane potential. The anomalous drop in peak amplitude of input current created by the calcium channels upon transfer by barium ions depends significantly on the potential across the membrane. The significance of bonded calcium in maintaining the functional properties of the calcium channels

upon transfer by barium ions depends significantly on the potential across the membrane. The significance of bonded calcium in maintaining the functional properties of the calcium channels is found to be quite great. Two possible explanations of the potential dependence of the effect are suggested: removal of the calcium ion from the calcium channel leads to a change in the electric field acting on the channel, manifested as disruption of functioning of the channel; or, the presence of the barium ion in the channel is the reason for the change in current observed. Figures 6; references 23: 2 Russian, 21 Western.

6508/9716
CSO: 1840/147

UDC 577.352.465:612.42

NEW CLASS OF Ca^{2+}-DEPENDENT POTASSIUM CHANNELS IN HUMAN T-LYMPHOCYTE MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 12, Dec 85 (manuscript received 12 Aug 85) pp 1190-1198

[Article by P. D. Bregestovskiy, A. Ye. Redkozubov and A. A. Alekseyev, Institute of Experimental Cardiology, National Cardiologic Science Center, USSR Academy of Medical Sciences, Moscow; Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka]

[Abstract] The properties and functional significance of potential-activated potassium channels in human T-lymphocyte membranes are not known. These channels may take part in activation of the lymphocytes in immune response. The process of activation is thought to be regulated by the concentration of free intracellular calcium. Local recording of potential across the membrane in these cells has revealed an unusual relationship between the level of free intracellular calcium in T-lymphocytes and the potential-dependent calcium current: increasing the calcium level decreases potassium conductivity. This indicates that human T-lymphocytes have a system of Ca^{2+}-regulated K^+-channels with previously unknown properties. Results of these studies indicate that these channels differ in a number of characteristics from those described earlier. Ion channels of great (about 200pCm) and small (about 20pCm) conductivity were found, activated by Ca^{2+} ions. The potassium channels discovered in this work have relatively low conductivity and are inhibited by Ca^{2+} ions. At high intracellular Ca concentration, the length of time the channels spend in a closed state is increased, beginning at internal Ca^{2+} concentrations of about 1 μM, 3 orders of magnitude lower than channels reported in previous studies. Figures 6; references 21: 2 Russian, 19 Western.

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UDC 577.352.42

INDIVIDUAL HIGH CONDUCTANCE CHLORIDE CHANNELS IN MOUSE PERITONEAL MACROPHAGE MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 12, Dec 85 (manuscript received 24 Jul 85) pp 1242-1246

[Article by A. A. Galkin and A. A. Malyaev, Laboratory of Biophysical Studies, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences]

[Abstract] A study of the electrophysiological properties of mouse peritoneal macrophages was conducted in order to determine the significance of ion conductance in the regulation of important cell functions such as activation, chemotaxis and secretion. Noncultured peritoneal macrophages obtained in smears from the abdominal cavity were studied, with ion currents reported by the patch method in the inside out configuration. The mean open life of the high conductivity channels studied was 40 seconds, closed life 0.5 seconds. The channels were markedly selective for chlorine ions with sodium/chlorine permeability ratio 1/2.7. Figures 4; references 8: 2 Russian, 6 Western.

6508/9716
CSO: 1840/147

UDC 616.1/.8-02:613.863]-02:612.82.015.2:547.943]-07

EFFECTS OF ENKEPHALINS ON MORPHOLOGICAL AND ENDOCRINE MANIFESTATIONS OF STRESS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 85 (manuscript received 4 Aug 84) pp 14-17

[Article by Yu.B . Lishmanov and T.I. Lisina, Laboratory of Radionuclide Research Methods, Siberian Branch, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Tomsk]

[Abstract] In view of the lack of data on the role of the endogenous brain peptides in stress, a study was conducted of the effects of an enzyme-resistant enkephalin analog on anatomical and endocrine manifestations of stress in outbred male rats. Stress consisted of suspension of the animals by the neck-fold for 12 h/day for 12 days. Experimental animals were treated with D-ala^2-leu^5-arg^6-enkephalin in a dose of 1.25 nmoles/kg/day. Comparison of the treated and control animals demonstrated that the enkephalin analog attenuated stress-induced changes consisting of increase in the weight of adrenals and involution of the thymus and the spleen. In addition, enumeration of ulcers in the gastric mucosa demonstrated that enkephalin was effective in reducing the count to 17.2 ± 9.4 vs. 47.5 ± 8.4 in the control rats. Measurements of blood hormone levels (hydrocortisone, insulin, aldosterone, prolactin, somatotropin) also yielded data compatible with the stress-attenuating effects of enkephalin. The death rate in the enkephalin-treated rats (27%) was almost twice as low as in the control rats (53%) after 12 days of stress, providing yet another indication of the therapeutic potentials of enkephalin. Tables 2; references 7: 3 Russian, 4 Western.

12172/9716
CSO: 1840/159

UDC 613.863-02:615.844]-07:616.153.943:547.95

EFFECTS OF AURICULAR ELECTROSTIMULATION OF MYELOPEPTIDE PRODUCTION AND RESPONSIVENESS OF BLOOD CELLS TO IMMOBILIZATION STRESS

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 85 (manuscript received 8 May 84) pp 26-30

[Article by A.M. Vasilenko, L.A. Zakharova and O.I. Belousova, Central Scientific Research Institute of Reflexotherapy; Institute of Immunology, USSR Ministry of Health, Moscow]

[Abstract] Immobilized F_1 (CBA x C57BL) female mice were employed in a study designed to define the role of myelopeptides in stress, and the effects of transauricular electrical stimulation on myelopeptide synthesis and responsiveness of blood cells to stress. The experimental animals were immobilized for 30 min and subjected to 5 Hz electrical stimulation. Transauricular stimulation resulted in an immediate increase in myelopeptide levels in bone marrow supernatant, reaching a maximum in 30 min and returning to baseline levels by 60 min. The maximum values were 2- to 3-fold greater than the control value. Stress alone failed to affect myelopeptide levels. The antistress effects of electrical stimulation of the auricles found manifestation in attenuation of the changes in blood cell counts seen with stress alone, as well as observed changes in the bone marrow. These differences were interpreted to represent the effects of enhanced myelopeptide synthesis in the experimental mice, which possess both immunostimulatory and analgesic properties. Figures 2; references 13: 9 Russian, 4 Western.

12172/9716
CSO: 1840/159

UDC 616-008.922.1-008.64+616.152.254-31-008.61]-092

HUMAN SENSITIVITY TO HYPOXIA AND HYPERCAPNIA AS INDICATOR OF INDIVIDUAL REACTIVITY

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 85 (manuscript received 9 Dec 84) pp 65-69

[Article by T.V. Serebrovskaya, Department of Respiratory Physiology, Institute of Physiology imeni A.A. Bogomolets, Ukrain an SSR Academy of Sciences, Kiev]

[Abstract] A cohort of 64 boys (15-17 years) was subjected to a battery of hypoxic and hypercapnic tests to determine the usefulness of their responses as indicators of general reactivity. Assessment of the effects on various physiological parameters, including pulmonary function tests, higher nervous activity, and skin tests, demonstrated that hypercapnia provided the more meaningful information on the basis of ventilation, chemical skin tests, hemodynamic parameters, and information processing. Individuals more responsive to hypercapnia were characterized by more efficient higher nervous processes as determined by visual information management, concentration parameters, and attention redirection. The preliminary findings were felt to indicate that such testing may have promise in occupational and athletic selection, as well as in clinical medicine. Figures 2; references 14: 12 Russian, 2 Western.

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ENHANCING RESPONSE OF PHARMACY SERVICES TO TASKS SET BY 27TH CPSU CONGRESS

Moscow FARMATSIYA in Russian No 3, May-Jun 86 pp 1-8

[Article by M. A. Klyuyev, Chief of the Main Pharmaceutical Administration, USSR Ministry of Health]

[Text] The 27th CPSU Congress has completed its work. The Congress took place at a time which might very accurately be termed a major turning point in the life of the country and the world as a whole. The work of the Congress proceeded in an atmosphere of adherence to Party principles and unity, exactingness and Bolshevik truth as well as a frank identification of shortcomings and omissions that included a profound analysis of our society's domestic and foreign affairs. The Congress demonstrated that the CPSU is consistently continuing the cause of the Great October Revolution while confidently pursuing the Leninist policy line and properly executing its role as political leader of the working class and of the entire Soviet nation. The Congress has adopted and approved the Party's general domestic and foreign policy which is a policy aimed at an acceleration of the country's socioeconomic development and the strengthening of global peace. This strategy was succinctly expressed in the Political Report of the CPSU Central Committee to the 27th Congress delivered by General Secretary of the CPSU Central Committee Mikhail Sergeyevich Gorbachev.

The 27th Congress approved the policy line and practical activity of the Party's Central Committee as well as the premises, conclusions, and tasks contained in the Political Report. The 27th Congress unanimously approved the new revision of the CPSU Program, the Party Charter with its amendments, and the Basic Directions of the USSR's Economic and Social Development for the 1969 -- 1990 and the Period up the Year 2000. All of these documents have received national approval.

The principal area of the Party's activity has been and remains economics. It is here that the prerequisites are being created for providing the Soviet people with a life that is materially abundant, spiritually rich and socially satisfying as well as for achieving a new quality of society. In the quarter of a century that has passed since the adoption of the third CPSU Program, the country's national economy has made significant forward strides. National income has increased almost fourfold, industrial production has increased by five times, and agricultural production has

increased by 1.7 times. The well-being of the nation has improved. Real per capita income has increased by 2.6 times, and public consumer funds have increased by more than five times. Housing conditions for most families have improved. The advances that have been made in science, education, and culture are well recognized. A new major step forward in this direction was also made in the course of carrying out the decisions of the 26th Party Congress.

While appreciating the merits of what has been achieved, M. S. Gorbachev noted in his report that the leadership of the CPSU considers it its duty to speak out honestly and frankly to the Party and the nation about our oversights, unfavorable tendencies in the social-spiritual area, and the causes for those phenomena. Ineffective and rigid forms and methods of administration, reduced dynamism in our work, and growing bureaucratism have all caused no small harm to our cause.

The Party's strategic policy line as worked out at the 27th Congress, calls for a transition to a highly effective and organized economy with highly developed productive forces, mature socialist attitudes towards production and a well-tuned managerial machinery. This will advance Soviet society to a qualitatively new level and will give full vent to the advantages of socialism in the areas of economics, science, culture, democracy, and in the people's entire way of life.

The Congress's attention was focused on problems of social policy, human needs, and a rise in the national well-being. The total amount of resources to be allocated in the forthcoming fifteen-year period to the improvement of living conditions is to be doubled. Real per capital income has been slated to increase by 1.6 to 1.8 times. Also slated to begin in that period is a step-wise increase in the wages of public health personnel. The documents of the Congress emphasize that the improvement in living conditions must be inseparably linked to greater labor and public output.

M. S. Gorbachev noted in the Political Report delivered at the Congress that "there is nothing more valuable to each person and to society as a whole than good health. The protection and strengthening of the people's health is a matter of primary importance. Health problems must be examined from broad social perspectives. Health is a definitive factor in working and living conditions and the level of well-being. It is essential to satisfy as quickly as possible the public's need for high quality therapeutic-preventive and medicinal assistance in all parts of our country."

Preventive medicine will be given more emphasis in the 12th Five-Year Plan period and greater efforts will be made to raise the quality of medical services. We shall also be implementing an annual universal preventive examination program for the entire population.

Plans have been made for an intensive development of the therapeutic-prophylactic institution network through the construction of general-purpose and specialized hospitals, hospital, polyclinic, and therapeutic-prophylactic building additions as well as through the continued construction of central rayon hospitals and dispensaries in order to improve rural medical services. The network of out-patient-polyclinic institutions, pediatric hospitals, and maternity homes is slated to be expanded at an accelerated pace. Plans are being made to open up hospitals accommodating 350,000 beds and out-patient-polyclinic facilities that will be able to receive 900,000 patient visits per shift.

The public health sector is getting better supplies of drugs and modern diagnostic and medical equipment.

The 1986 -- 1990 program for improving the quality of medical service that was adopted by the 27th CPSU Congress provides for a major improvement and radical restructuring of the entire present method of drug supply and mechanism of finding new organizational means of rendering and improving the quality of pharmacy services.

The medical industry output in the 12th Five-Year-Plan period is slated to increase by at least 1.4 times. Plans have been made to increase the production of highly effective drugs, primarily those used to treat the most prevalent illnesses.

A most important direction in the activity of pharmacy administrations, pharmaceutical institutions, and all pharmacy personnel must entail the execution of measures designed to satisfy completely the ever-increasing need of the public health sector for medicinals in connection with the planned expansion of therapeutic and out-patient polyclinic facilities and the rise in the scope of medical services as well as the planned universal preventive health examinations. That activity must also include a better balance between the quality of rural and urban medical services and improved obstetric and pediatric services.

A successful resolution of the tasks concerned with the timely and complete supply of medicinals to public health institutions and the public requires that the need for drugs and medical items be determined properly. We have acquired considerable experience in this area in our country. This is being done locally by supervisors and principal specialists of public health offices and institutions, pharmacy administration personnel, and scientific associates of the specialized medical scientific-research institutes. However, in a number of the country's regions the work being undertaken by health authorities and pharmacy administrations on determining the needs for drugs does not meet contemporary requirements.

The quality of planning and justification of current and future needs for drugs and medical items at all levels of the public health sector will depend on how accurately local authorities take the following factors into account:

1) an expansion in the scope of therapeutic-prophylactic assistance, and primarily specialized medical assistance;
2) a step-wise universal public preventive medical examination program;
3) the complete use of funds appropriated for hospital patients;
4) a higher level of rural medical services.

Automated drug stock inventories must play an increasingly leading role in planning and forecasting needs for medicinals and medical supplies. This will make it possible to have objective data on the turnover dynamics of various groups of preparations. Constant efforts must be made in that connection to improve existing forms and methods of interaction between pharmaceutical and medical personnel as well as to find new methods. The evaluation of drugs by a board of experts for the purpose of forecasting drug needs has proven its value in practice.

As a rule, the expert commissions include leading specialists from various fields of medicine and health administrators. This makes it possible to have scientifically substantiated and objective data for forecasting the needs for individual medicinals (or groups of preparations) that are also applicable to current public health problems and contemporary scientifically substantiated methods of treatment.

The Party's decisions regarding the complete satisfaction of the public health sector's need for medicinal agents cannot be fulfilled without a further improvement in the system of supplying drugs to the public. Perhaps this can be accomplished most successfully by the broad use of computer technology and automated control systems.

In 1985 a complex of interconnected automated control system tasks of the Main Pharmaceutical Administration subsystem was commercially inaugurated at the republic level (without oblast division) in Latvia, in the RSFSR with oblast division, and at the union level. It is essential that the union republic ministries of health and the Main Pharmaceutical Administration of the USSR Ministry of Health place the country's entire pharmaceutical service on an automated planning and control system as quickly as possible, beginning with the processing of inventory results and ending with the making of operative decisions concerning the supply of medicinals to in-patients and out-patients.

Warehouse facilities is another problem closely tied to improved drug supply. In the 11th Five-Year Plan period constant attention was given to strengthening the material base of pharmaceutical warehouses. Warehouse space was expanded by 360,000 square meters. The mechanization of loading and unloading operations was improved. In spite of this, the warehouse facilities situation remains strained. The actual amount of available warehouse space and the condition of warehouse equipment cannot guarantee the timely receipt, processing, and proper storage of incoming drug resources and medical supplies. In the 12th Five-Year Plan period pharmacy administrations must exert their efforts to increase warehouse space and to enlarge the number, equipment and reconstruction of presently operating

pharmacy warehouses so that they are brought up to the level of contemporary scientific and technical achievements. The mechanization of labor-intensive processes at pharmacy warehouses must be expanded. No less important is the optimal distribution of pharmacy warehouses in the individual regions so that their locations take into account the regions' socioeconomic and geographic factors and the extent of their highway and railroad network. Problems concerning improved pharmacy warehouse efficiency and an optimal space design system for storing goods require further elaboration.

The pharmaceutical services have been assigned additional tasks in the 12th Five-Year Plan with respect to supplying chemical reagents to public health institutions. The necessity to improve the warehouse facilities situation is particularly acute in connection with the task of providing a full complement of medicinals wherever they are needed. This problem cannot be resolved without a constant supply of reserve medicinals and reagents as well as essential changeover reserves at the warehouses.

Better drug supply is dependent upon the system of pharmaceutical information. Improvement of the pharmaceutical information system is a problem that demands the fastest possible solution. As of the present a concise structure for the information service has not been defined and there are a number of unresolved problems concerning the operation of pharmaceutical information offices, reference bureaus and their methodological supervision as well as the study, correlation, and broad implementation of the advanced experience gained in providing information about drugs to physicians and the public. In practice this has led to a situation where patients in some places are not being continuously provided with medicines by hospitals, polyclinics, and pharmacies. This in turn results in longer periods of patient observation and treatment. Current therapeutic practice does not take full advantage of all the drugs available in the pharmacy network, and this has an adverse effect on the course of drug therapy. This situation can no longer be tolerated. The All-Union Scientific-Research Institute of Pharmacy, the All-Union Information Bureau of the USSR Ministry of Health, and the pharmacy administrations must accelerate their efforts to improve the information provided to physicians and the public about drugs through the use of automated control systems, an automated information service, and the broad use of modern means of communication in pharmaceutical information and reference bureau offices. The resolution of these problems will make it possible to give timely information to physicians about the structure and shelf life of drugs, their pharmacological properties, and compatibility with other medicinal agents. It will also enhance a faster introduction of new drugs into medical practice.

A key factor in the intensification of the national economy as set forth by the Party includes a major acceleration of scientific and technical progress and a broad incorporation of new generation technology that will provide the highest possible productivity and efficiency.

A first priority task in this regard is a profound technological reconstruction of the national economy based on the very latest scientific and technical achievements. Every sector, enterprise, and association must have a concise program for constant plant renewal. All of these tasks are also fully applicable to pharmaceutical services.

An All-Union conference of pharmaceutical personnel was held in June 1985 for the purpose of mobilizing pharmacy personnel collectives to resolve tasks concerned with improving the supply of medicinal products to the country's populace and to accelerate the incorporation of scientific and technical achievements into pharmacy practices. A number of measures were devised for the further improvement of the pharmacy system's operations.

In appraising the work undertaken in the 11th Five-Year-Plan period to expand the pharmacy network and strengthen its material and technical base and improve drug supplies to the public, one should note that full medicinal assistance to the public was not available everywhere. The network of pharmacies is still insufficient in the Armenian, Azerbaijan, Tajik, Kirghiz, Kazakh, Turkmen, and Moldavian SSR, and in a number of oblasts and rayons of the RSFSR. Almost 7,000 paramedical-obstetric stations are without pharmacy stations, and there is a shortage of mobile pharmacies in republics with large rural populations.

In order to implement the policy adopted by the Party to satisfy the public's need for high quality medicinals everywhere, the main pharmaceutical administrations of the union republic ministries of health, the pharmaceutical administrations of the autonomous SSR, krays, oblasts, and cities must reexamine their plans for pharmacy network development so that the required standard levels will be met. They must also provide for a faster development of pharmacy networks in rural areas, complete the organization of 2nd category pharmacy stations at paramedical-obstetric stations in 1986, implement the construction of rural pharmacies in conjunction with dispensaries, and set up a system of pharmaceutical institutions at all levels of the public health sector.

The network of pharmacy institutions in a whole series of republics (Lithuanian, Latvian, Estonian SSR, and a number of oblasts in the Ukrainian SSR) have now reached the level of standard requirements . Under these conditions it would be advisable to study the efficient specialization of the pharmacy network in the major cities of those republics with the purpose of achieving the highest possible levels of pharmacy operation and the full utilization of material and personnel resources to provide high quality medicines to the public.

The policy aimed at an acceleration of socioeconomic development entails a need for a profound restructuring of the operational machinery and the creation of an integrated, effective, and flexible system of management. With these purposes in mind, greater importance will be given to a direct relationship between personnel income and work efficiency. In order to realize these goals in the pharmacy system, it will be necessary to study

and to make necessary adjustments in the relationship between material incentives for pharmacy personnel and their personal contribution and the final work results of each worker. It would be advisable and timely to undertake a wide-scale experiment to incorporate the brigade form of labor organization in the country's pharmaceutical institutions.

A higher level of pharmacy personnel performance is the basis for improving the efficiency of pharmaceutical production both within the enterprises of the pharmacy system and in the pharmacies themselves. The quality of medicinal assistance takes on a greater social significance in the light of the universal preventive medicine examination program which in turn necessitates the adoption of high standards in the work performance of pharmacy personnel. In that connection, in the 12th Five-Year Plan period it will be necessary to expand and devise new criteria for evaluating the performance of both individual pharmacy personnel and entire collectives with respect to the final results of their work.

The problem of high quality is a particularly vital one at a time when the public health sector is confronted by the new enormous tasks concerned with improving public medical services. Our task entails the steady and persistent improvement of public pharmaceutical services as a whole and of its various components, including quality drugs. In the 12th Five-Year Plan the pharmaceutical administrations must pay particular attention to questions of quality and activate the implementation of positively recommended comprehensive quality control systems as important resources for improving the supply of medicines to the public.

One of the important aspects of good medicinal supplies should include a fuller satisfaction of the need for parenteral solutions and other injectable forms of medication at therapeutic-prophylactic institutions. The enterprises of the Ministry of the Medical and Microbiological Industry have considerably shortchanged pharmacy personnel on this score. The planned increase in the production of parenteral solutions for the 12th Five-Year Plan cannot possibly fully satisfy the needs of the health sector. In that connection, the enormous task of preparing such solutions has fallen to the lot of pharmacy personnel. The organizational principles of manufacturing parenterals for therapeutic-prophylactic institutions should be revised so that their manufacture is concentrated in inter-hospital pharmacies. The Main Pharmaceutical Administration [henceforth MPA] of the USSR Ministry of Health and the MPA of the union republic ministries of health must in the immediate future examine and resolve problems concerned with the production and provision of equipment required by such pharmacies as well as the required staffing and wage schedules for their personnel. Model designs of such pharmacies must be worked out in the 12th Five-Year-Plan period. These model pharmacies should be provided with modern equipment and the essential technical instruments, and the designs should include an arrangement for all types of drug quality control.

The successful execution of the tasks established by the 27th Congress to raise the level of drug services can be assured only with the active creative participation of all pharmaceutical personnel with each worker personally responsible for the assigned task at hand, and where that work is undertaken at a high level of efficiency, discipline, and in a business-like manner. In that connection, we are faced with considerable tasks in the improvement of personnel performance. Pharmacy personnel are unevenly distributed in the republics. Whereas the Baltic republics, the Georgian SSR and a number of territories in the RSFSR, the UkSSR, and the BSSR have a high density of pharmacy personnel, the number of specialists in many oblasts of Central Asia and Kazakhstan is 1.5 to 2 times less than the national average. These areas are in great need of specialists, especially those with higher education. The shortage of pharmacists and pharmacist technicians lowers the quality of drug services, and in a number of cases impedes the development of the pharmacy network and improved drug supply to the public.

A number of republics have serious shortcomings in personnel training and placement. Pharmaceutical institutions are faced with considerable tasks to improve drug services to the public. Those tasks require that all specialists be very knowledgeable about pharmacy and the allied disciplines. This consequently places considerable demands upon the institution supervisors. Today there are still unresolved problems concerned with the timely improvement and advancement of supervisor qualifications at pharmaceutical institutions. We should examine proposals in which institution supervisors might be able to raise their qualifications in two to three years by taking short-term (two to 3 weeks) courses of advanced training. Existing programs should be revised for this purpose so that they include studies on the most important and pressing problems in pharmacy.

The considerable tasks concerned with a radically better supply of medicinals to the public and therapeutic-prophylactic institutions cannot be successfully resolved without the activation of the human factor. Each worker in every pharmaceutical collective must conscientiously perform his duties to the fullest extent and there must be a significant improvement in labor relations work in each collective. Wide use must be made of socialist competition and campaigns for adopting a communist attitude to labor, and a decisive struggle must be waged against the lack of discipline, inattentive and callous treatment of patients, and abuses of authority. Much has yet to be done in order for all pharmacy workers to carry out their official and professional obligations precisely and with a high sense of duty. And these demands are quite precise, i.e., each patient who comes to a pharmacy must be provided with the medicine prescribed by the physician. Special attention should be given to disabled veterans and workers, veterans of the Great Fatherland War, the Civil War, and the Great October Socialist Revolution. Pharmacy services in all areas of operations should be imbued with concern for and attention to children.

In December 1985 the collegium of the USSR Ministry of Health examined measures for improving medical and drug assistance to obstetric institutions. The pharmacy services area was severely criticized at that collegium.

Modern treatment can be successful only when the essential variety of effective medicinal agents is available. This particularly applies to the treatment of children and infants. The slightest bit of negligence and each breakdown in drug availability is fraught with danger not only for the child's health but its life as well. Nevertheless, this most important state problem is not regarded by pharmacists everywhere with the professional responsibility that is required. Based on the Party's instructions to the effect that one of the most important areas of public health sector activity should be the development of obstetric services on a priority basis, it is absolutely essential that the maximum complement of drugs and medical supplies be made available to obstetric institutions and infant and premature divisions of pediatric hospitals on a priority basis.

The decisions of the 27th Congress emphasize that the implementation of the Party's strategy of profound transformation will require a considerable amount of time. That is why the pace of improvements must be quickened, even now. We therefore have the task of fully mobilizing all our resources -- the organizational-economic and sociopychological factors, and make better use of our present production potential, stimulate labor incentives, strengthen organizational efficiency and discipline, overcome mismanagement, and not overlook wasteful spending. The problem of drug shelf life is particularly applicable and an important factor in pharmacy services. In view of the enormous territorial expanse of our country, it is impossible to have drugs with short shelf lives (two years or less) available everywhere at all times, or to build up a reserve of such drugs that could be regularly supplied to therapeutic-prophylactic institutions throughout the year. Therefore, in a large number of cases it is not possible to determine accurately what the needs for such preparations are. At the same time, industry is doing a poor job of increasing the shelf life of medicinals. The Pharmacopeia Commission of the USSR Ministry of Health should be more actively involved in that work. The shelf life established for new drugs should allow for the longest possible usage period. Studies concerned with a reexamination and prolongation of drug shelf life must be undertaken systematically.

Pharmacy personnel must be more active in improving the quality of the therapeutic process and they should systematically work on introducing new medicinal agents and make timely suggestions for removing ineffective and obsolescent preparations from the drug products lists. In order to resolve these problems it would be advisable to review the entire drug products list at least once every five years so that the replacement of existing drugs by new ones can be clearly planned.

Further improvements in the pharmacy system are impossible without the active employment of our scientific potential and the accelerated practical

incorporation of scientific achievements. In the meantime, the quality of many scientific investigations and dissertation papers does not always measure up to present-day demands. The time has come to review the criteria we use to evaluate scientific endeavor. One must not consider the publication of scientific articles to be the final result of scientific research. The results of scientific studies must be implemented at the republic or union level, and this can be done only if scientists study and resolve vital problems and questions related to pharmaceutical science and pharmacy practice.

The country's coordinator of scientific research in the field of pharmacy, the task force commission Pharmacy, has not always effectively fulfilled its supervisory role. There have not been enough theoretical, organizational and economic studies of pharmacy system management. This particularly applies to studies on improvements in the organizational forms of drug supply, the productivity of pharmacies, and the manufacture of medicines in pharmaceutical institutions through the use of new technology as well as to the use of modern instruments, apparatus, and medical equipment. These problems are of great importance to better public pharmacy services, and we have every right to expect that our scientists will be more active and effective in resolving the tasks that confront pharmaceutical science.

Pharmacy practice is also awaiting a rapid improvement in the organization of drug supply at all levels, i.e., at the level of the rayon, oblast, and the republic. There must be an improvement in the methodical approaches to the scientific substantiation of planning and forecasting medicinal needs.

Much basic research remains to be done in the field of pharmacognosy, the development of modern low-waste processes for making plant extract preparations, and in the search for preparations and drug forms that do not contain alcohol. There are still many shortcomings and unresolved problems concerned with an effective and active information retrieval service whose solutions require the joint efforts of research and practicing pharmacists. As has been demonstrated by the experience of the pharmaceutical administration information service in the BSSR, the UkSSR, a number of RSFSR oblasts, and Latvia, this can be accomplished only through the use of modern computer technology, microcomputers, and communication lines.

The organization and management of drug supply, the adoption of advanced forms of labor organization, and an improved performance of pharmaceutical institutions are urgent problems that require rapid solution in the 12th Five-Year Plan period. Efforts in all of these areas have been outlined and will be carried out on the basis of modern scientific achievements.

These and other tasks concerned with a radical improvement in drug supply organization and pharmacy services planning and management cannot be resolved without the broadest possible introduction and utilization of computer technology at all levels and stages of pharmaceutical services.

The demands of the present day require that science must be decisively oriented to industry, and industry to science. This means that all the links joining science, technology and industry must be strengthened, and that conditions must be created for the rapid practical implementation of all that is new and advanced. Pharmacy is one of the top priority services of the public health sector which has been entrusted with the enormously important task of providing that sector with a full complement of all essential medicinals, medical supplies and reagents. The area of pharmaceutical services has been designed in an economic and efficiently organized manner and is capable of successfully resolving the problems confronting it. Thanks to the considerable and fruitful efforts undertaken by the pharmacy administrations and pharmacy institution personnel to supply medicines to the public, the pharmacy services are finding increasing understanding and support on the part of the Soviet and Party organs. The successful resolution of tasks concerned with improved drug supply as stipulated in the decisions of the 27th CPSU Congress require that the pharmacy service administrative authorities must coordinate all of their work more closely with public health authorities with respect to supplying drugs to the public and therapeutic institutions. The pharmacy administrations and institutions have the necessary potential and resources to resolve this important social problem successfully.

The country's pharmacy workers will make a fitting contribution toward the realization of the decisions of the 27th CPSU Congress in every pharmacy collective.

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PROBLEMS IN DRUG SUPPLY

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 9 Sep 86 p 3

[Article by V. Merkulov: "Tablets Put Aside"]

> [Text] An unexpected inspection of the office of Deputy Chief of Main Pharmacy Administration G. Sultanova turned up some surprises. Found there without price markings were two small bottles of the blood substitute Protein and twenty packages of the Yugoslav preparation Flyugaliya which hasn't been brought into the republic for the past three years.
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> "Where did you get this?" wondered the officials from the republic's MVD UBKhSS [Administration for Combating the Embezzlement of Socialist Property and Speculation]. G. Sultanova's reply was not convincing.
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> As is known, a supervisor's habits are quickly picked up by her subordinates, and the resulting chain reaction is impossible to stop.

Here we have the central pharmacy warehouse. Last November former Chief of Division No. 7 N. Voronitskaya was found to be short over 7,000 rubles in the course of commodity receiving and shipping operations. However, repayment was not forthcoming. Division accountant N. Galak, having made a criminal deal with commission members, revised the inventory list to show that there was a balance of 274 rubles instead of 7,000 ruble shortage.

That was one division chief. And here is another -- V. Peyeva. An audit of her division No. 13 turned up a shortage of 2,600 rubles. Peyeva then got off with a mild scare. The materials incriminating her were not sent to the investigating authorities, and after the shortage was covered she was transferred to another post. However, her case was continued. When inspectors made a surprise audit of Division No. 13 this July they discovered a surplus of 337 rubles and a shortage of 142 rubles.

Let's take a closer look at the circumstances at the Main Pharmacy Administration (GAPU) that surround this intriguing situation. We'll start with the production base. Only 40 percent of the republic's pharmacies

have warehouses (moreover, many of them do not meet the standard requirements). For example, the area of the Central Pharmacy Warehouse (TsAS) is only one-third of the standard required space. Warehouses are practically non-existent in the Kulyab Oblast and Gorno-Badakhshan Autonomous Oblast. There are no refrigerator rooms in the Kurgan-Tyubin Pharmacy Warehouse where the temperature reaches 30 to 40°C and more in the summer. There is no point to talking about the quality of preparations stored under those circumstances.

The republic does not have enough pharmacies, particularly in the rural areas. Whereas the national ratio of population to pharmacies is 7.4 thousand persons per pharmacy, in our republic we have one pharmacy for every 13.3 thousand persons. That figure ranges from 15 to 27 thousand persons in the Komsomolabadskiy, Garmskiy, Leninskiy and several other rayons.

The material and technical base of pharmacies is extremely unsatisfactory. Only fourteen pharmacies, three and one-half percent of the republic's total number of pharmacies, are located in premises that meet the standard requirements. Controls over the sanitary condition of pharmacies has been poorly organized by the rayon SES [Sanitary and Epidemiological Station]. Pharmacies Nos 18, 28, and 106 of the Kurgan-Tyube Oblast were not checked at all by the SES in 1985 although they are supposed to be inspected twice each quarter of the year. Once a pharmacy is not inspected, they are apparently assumed to be without shortcomings and without any need of improvement.

But there is a multitude of shortcomings. Just take drugs and medical products. How much of those items are needed by the pharmacies? No one knows for sure because the commissions that plan for these needs operate in a pro forma fashion without regard to the import of the requisitions submitted. The fog that surrounds the manner in which present and future planning is undertaken will result in unjustifiable increases of imported medicinals that are no more effective than domestic drugs.

The lack of substantiated planning has another aspect. Inasmuch as no one in the GAPU knows what and how much is needed, there are considerable delays in the delivery of medicinal preparations to the pharmacies. Thus, in five pharmacies of Dushanbe 5.7 percent of the patients could not get the medication they needed.

Under these circumstances, GAPU somehow managed to underestimate the 1986 requisitions for a number of general category drugs such as adrenalin, pektussin [mentholated lozenges], klofelin, eye drops, etc. At the same time a whole series of preparations was declared to be in excess of demand. For example, antitubercular drugs. A half million rubles' worth of those drugs have now been stockpiled at the Central Pharmacy Warehouse. In spite of this, requisitions for these drugs for the year 1987 have gone up sharply.

There are now more than 60,000 doses of flu vaccine valued at 32,000 rubles that are in danger of being written off the inventory lists. No one seems to know what to do with this vaccine.

Large stockpiles of drugs have accumulated in other places as well. The surgery division of the Kurga-Tyube Oblast Hospital, for example, has 100 packages of allochole and another 100 packages of tefellin; the pediatric infectious division of the Pyandzh Central Rayon Hospital has 260 tables of nystatin on hand and 270 tablets of potassium oratate. This very large stock is being used slowly so that in many places the expiration date of these preparations has long since passed. Such places include, for example, the Kanibadamskiy Rayon Central Rayon Hospital, the oblast hospital of Leninabad, the Rayon Health Resort Hospital-3, and pharmacy No 290 in Dushanbe.

Records of drug dispensation are poorly kept in a number of places. Consequently, patients who have gone to pharmacies No. 9 and No. 285 of Kanibadam or to pharmacy No. 2 in Dushanbe could not get drugs that were actually there. There has been no public criticism of GAPU operations. Pharmacy personnel are rarely accountable to the public or collectives of industrial enterprises, kolkhozes and sovkhozes.

The pharmacy personnel situation is poor. The number of specialists available to the public did not increase during the last Five-Year Plan period. The ratio has been 3.9 specialists per 10,000 inhabitants. This is twice as low as the national average. A number of supervisors have not been carrying out their official obligations and have poor professional training, but the GAPU has not been making the demands required of them.

In such circumstances the system has been inundated by false inventory reports, embezzlement, forgery...

On July 7 the commission discovered a cash box shortage of 254 rubles and 54 kopecks at pharmacy No. 45 in Yavan. There was also a merchandise shortage totaling 157 rubles and 61 kopecks. The same thing was discovered at the central rayon pharmacies No. 25 in Garm, No. 13 of Ordzhonikidzeabad, No. 111 in the Leninskiy Rayon, in pharmacies Nos. 29 and 341 of Dushanbe, and in number of divisions of the Central Pharmacy Warehouse.

One must say that the record-keeping at the central pharmacy warehouse has been very careless. Erasures, corrections, inaccurate entries... The result of all that is every possible kind of machination. A huge number of forged prescriptions for scarce medicines signed by non-existent physicians were discovered at pharmacy No. 111 of Leninskiy Rayon and pharmacy No. 341 in Dushanbe.

But, just wait a minute, where was the GAPU administration looking? What kinds of measures were undertaken? Let's take a look. On April 3 physician Alimov of polyclinic No. 10 gave a prescription to a certain Kholmurodov for lidaza [hyaluronidase]. A check showed that there was

neither a record card for the patient nor a physician Alimov at the polyclinic. Nevertheless, the prescription was personally passed by GAPU chief S. Abdullayev.

Another prescription for lidaza was written for Safarov at Rayon Health Resort Hospital-3. The prescription was neither stamped by the polyclinic nor did it have a physician's personal seal. On the other hand, it was passed by Abdullayev.

And so on and so forth. A huge number of preparations that were short in supply on paper and with the approval of high officials at GAPU were illicitly disappearing from the pharmacy. But if that is so, they had to cover up their tracks. And so the prescriptions passed by the GAPU chief and his deputy G. Sultanova, were turned in by the managers of the capital city's pharmacies Nos. 2, 76, and 341 to Sultanova personally at the end of each monthly accounting period. Then, upon the oral instructions of Abdullayev, they were destroyed. Without any official order, without any enumeration of the types and amounts of scarce preparations that were being dispensed through these prescriptions. Surely Abdullayev and Sultanova knew only too well that the prescriptions had to be kept on file for one year.

The co-workers who took part in the destruction of the prescriptions could not say whether the number of scarce medicinals listed in the burned prescriptions actually corresponded to the number of medicines dispensed during the accounting period. Yes, they couldn't possibly know that since they simply never saw what was written in those prescriptions.

But that's not all. Taking advantage of the fact that the GAPU chief was not exercising any control, his deputy Sultanova redistributed medicines in high demand as she wished. A person who was obliged to think first of patients created conditions at his own discretion whereby some pharmacies overfulfilled their plans while others were faced with artificial difficulties. As a result, people suffered.

Once officials in high places were allowed to do this, what would you expect from lower echelon persons? In order to create the appearance of an orderly state of affairs at the Central Pharmacy Warehouse, his commodity experts systematically consign to the pharmacies seldom used drugs in excess of the requested amounts. Consequently, the Central Pharmacy Warehouse flourishes while in the pharmacies of Dushanbe alone the amount of above-normal residual stock has come to 380,000 rubles. And what does an excess of stock mean? It makes it impossible to control drug shelf life and violations of drug storage regulations in a timely fashion. So, you get a vicious cycle: By deceiving itself, GAPU is also deceiving the sick. An alarming symptom!

This symptom has been noticed for a long time. Over a period of a few years the republic's Ministry of Health has been sending instructions to the GAPU chief to improve his administrative operations and correct the

disorder in his subdivisions. But nothing has changed at GAPU.

The conclusion to be drawn is clear. GAPU, which is supposed to be safeguarding public health, is itself incurably sick. Also quite clear is the diagnosis: Mutually guaranteed cover-up, swindling, and fraudulent record-keeping. Here is another typical example: In the period between December 1, 1985 and April 13, 1986 only 17 out of 392 pharmacies received shipments of the scarce drug Finalgon from the Central Pharmacy Warehouse. Moreover, only 142 packages were sent to the pharmacies while the remaining 1,490 packages stayed in the warehouse. Why? Or for whom? The fact that a large number of drugs that have been constantly in short supply (Kenalog, cocarboxylase, valerian extract) is just sitting in that same central warehouse can only be explained by that same sickness of GAPU.

If an organism is chronically ill, one must find the cause of the illness and eradicate it, for the good of the organism itself and for all who surround it.

6289
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BRIEFS

COMPUTERIZATION OF CHILDREN'S HOSPITAL--(GRUZINFORM)--The (Georgian) republic Children's Clinical Hospital is converting to total computerization. Positive steps in that direction have already been taken. The computer has assumed responsibility for monitoring the childrens' medical history, and studies are being conducted to expand biochemical analysis and various echo studies using the computer. Graphic representations of disorders and information on their characteristics are being stored in its memory bank. Soon, the computer will also assist dieticians on a twenty-four-hour basis. It will accurately calculate the childrens' daily food allowance, make up a menu, and adjust calorie content. [Text] [Tbilisi ZARYA VOSTOKA in Russian 23 Aug 86 p 4]

/9716
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SOCIOLOGICAL STUDIES OF DEMAND FOR DRUGS

Moscow FARMATSIYA in Russian No 3, May-Jun 86 (manuscript received 5 Jul 84) pp 12-17

[Article by S.G. Sboyeva, L.A. Sukhanova and V.G. Medvedev, 1st Moscow Medical Institute imeni I.M. Sechenov; Kursk Medical Institute; Moscow Economic-Statistical Institute]

[Abstract] A systematic approach to determination of the use of drugs and to prediction of demand for drugs by the use of sociological surveys is described and discussed. Surveys used to obtain data from pharmacists, patients and physicians are illustrated and discussed. Demand for and provision of cardiovascular drugs are used to exemplify analysis of the structure and dynamics of factors which affect the demand for drugs, the use of generics, the intensity of demand and standards of actual demand per 1000 population. Data concerning drug use in relation to age and sex for workers and retirees are presented. Use of this approach has made it possible to differentiate demand for drugs according to the social and demographic structure of the population. Use of such surveys 2-3 years before the end of each Five-Year Plan is recommended. References 11 (Russian).

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UDC 614.27:362.6-058.65

ORGANIZATION OF OPERATION OF ALL-UNION RESEARCH INSTITUTE OF PHARMACY PHARMACIES FOR PROVISION OF FREE AND CUT-RATE DRUGS AND MEDICINE

Moscow FARMATSIYA in Russian No 3, May-Jun 86 (manuscript received 29 May 85) pp 65-67

[Article by Z.T. Yakunina, Pharmacy of the All-Union Scientific Research Institute of Pharmacy, Moscow]

[Abstract] The role of pharmacies of the All-Union Scientific Research Institute of Pharmacy in provision of free medicine and medical needs enjoyed by hospital patients to out patients is described and discussed. Diabetics

were the first to obtain free out-patient drugs and medical needs. This privilege was extended to include victims of many other diseases, from October 1961-November 1978. Now persons with hypophyseal nanism, leprosy, dysentery, rheumatism, tuberculosis, Addison's disease, schizophrenia, epilepsy, rheumatoid arthritis, oncological and hematological diseases receive free medicine and medical needs. Special attention is given to providing free medicine to World War II veterans and invalids and to providing cut-rate drugs for retirees and their families. Monitoring of the provisions pertaining to supply of free and low-cost drugs by the [author's] VNII of Pharmacy pharmacies was described and discussed. All free and cut-rate prescriptions are placed in one or more of 13 categories and there is careful accounting of their issuance. Special sections prepare and issue prescriptions for war veterans and invalids. Figures showing the increase of the number of prescriptions issued for the different entitled groups over the last 4 years are presented and discussed.

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UDC 615.15:[615.12+614.27]:31

STATISTICAL STUDY OF LENGTH OF SERVICE OF YOUNG PHARMACISTS SPECIALISTS

Moscow FARMATSIYA in Russian No 3, May-Jun 86 (manuscript received 14 Feb 85) pp 80-84

[Article by V.L. Bazarnyy and I.M. Razdorskaya, Kursk Medical Institute]

[Abstract] Transfers of pharmacists (related to length of service or regular transfers)--studied, by the method of cohorts--included pharmacists of Kursk Oblast Pharmacy Administration who graduated in 1971-1978. There were 58-63 persons in each of eight cohorts studied. The mean length of service of one specialist who experienced one intra-professional service transfer was 1.15 years (between 1st and 2d transfer). The mean length of service of specialists receiving 3 intra-professional transfers was 14 months from 1st to 2d transfer and 1 year from 2d to 3d transfer. The study showed the effectiveness of the use of cohort analysis to study transfers of pharmacists, the effective use of such personnel, the prediction of mobility of pharmacists and management of job stability for such workers. References 2 (Russian).

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GOALS OF MOSCOW HEALTH PLAN

Moscow MOSKOVSKAYA PRAVDA in Russian 28 Oct 86 p 2

[Article by I. Krasnopolskaya, based on interview with Leonid Ivanovich Matveyev, deputy chairman, Moscow Executive Committee]

[Abstract] In order to improve the health statistics for Moscow, plans have been made and implemented to raise health awareness, and to improve health delivery. The concrete problems which have been addressed deal with overcoming the physician shortage, improving health and recreational facilities at places of work, and the implementation of mass screening (dispensarization). In the latter case, it is anticipated that by 1990 approximately 90% of the population of Moscow shall be encompassed by this program. Proper nutrition remains another problem to be rectified, particularly the special diets required by various categories of patients, such as diabetics and cardiacs. These and other measures are expected to lower overall morbidity in the city, and markedly reduce the loss of work time due to sick leave.

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HEALTH PROGRAM IN SIBERIA

Omsk ZEMLYA SIBIRSKAYA-DALNEVOSTOCHNAYA in Russian No 8, Aug 86 pp 50-52

[Article by D.A. Potashov, docent, Omsk Medical Institute]

[Abstract] The "Health in Sibiera" program is currently being implemented in Western Siberia with particular attention to the need of the agricultural sector. One of the primary tasks is the development of a network of health facilities, staffed with highly qualified medical personnel, to provide on-site medical care. In addition, efforts are being made to enlist senior staff from central hospitals and medical institutes to provide expert consultation at the level of village clinics. The latter policy would ensure efficient utilization of medical expertise at the village clinic without loss of time for referral to a major center. In conjunction with mass screening (dispensarization) and emphasis on prevention, such an approach can be anticipated to lead to a further drop in the use of sick leave by agricultural workers and in the time lost from work.

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ORGANIZING SUPPLY OF MEDICAL GOODS TO PHARMACIES IN RSFSR

Moscow FARMATSIYA in Russian No 5, Sep-Oct 86 (manuscript received 20 Nov 85) pp 6-9

[Article by M. Ye. Voloshin, A.D. Apazov, V.A. Tsaryeva, G.A. Tangiyeva and N. S. Tsirkova, Moscow Scientific Research Institute of Epidemiology and Microbiology imeni G.M. Gabrichyevskiy]

[Abstract] As a part of studies on improvement of the supply system for pharmacies in the RSFSR, the authors studied reports by oblasts in the Nonchernozem zone, the Northern Caucasus, Volga, Western Siberian, Eastern Siberian and Far Eastern economic regions on the level of pharmaceutical support of the population, growth rate of production of pharmaceuticals and medical products, and associated costs and other indicators of the activity of pharmacies. The organization of supply and methods of operation of central rayon pharmacies as supply centers were analyzed. Significant differences were found in the frequency of unavailability of medications or medical products at pharmacies depending on the organization of supply. Centralized supply systems were found to be most effective for autonomous SSR's, krays and oblasts. Supply of pharmacies through central rayon pharmacies was found to be nonprogressive, leading to additional costs and increased frequency of unavailability of needed medications and supplies. Whereas centralized warehouses stock some 4,000 different types of medications and medical supplies, the typical central rayon pharmacy stocks only 1,500 - 2,300 different items. In remote areas in which the network of pharmacies has no direct communications with oblast warehouses, where the distance to the nearest warehouse may be 300 - 1,500 km, and where goods may be delivered only once or twice per year during the navigation season, central rayon pharmacies should be used as supply points for surrounding pharmacies. Reference 1: Russian.

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UDC 615.012:001.5:008

INFLUENCE OF SCIENTIFIC AND TECHNICAL PROGRESS ON DEVELOPMENT OF FUNDAMENTAL WORK IN AREA OF PHARMACEUTICAL SYNTHESIS AND ITS INTRODUCTION TO PRACTICE

Moscow FARMATSIYA in Russian No 5, Sep-Oct 86 (manuscript received 13 Nov 85) pp 33-34

[Article by N. M. Turkyevich, Lvov Medical Institute]

[Abstract] A report at the June, 1985 plenary meeting of the CC CPSU noted that the development of fundamental science must be given priority and that the capabilities of university science are not being fully utilized. This is particularly true of the pharmaceutical sciences, especially pharmaceutical synthesis. Programs are generally obsolete, and the graduates of pharmaceutical

schools or departments are not familiar with modern medications. The author calls for fundamental work in universities to determine the way in which the structure of synthesized substances influences their pharmacologic effects. This should be done particularly in universities which systematically perform pharmaceutical synthesis (Lvov, Kharkov, Ryazan, Zaporozhye, Kaunass and Leningrad Universities) as well as the Institute of Organic Chemistry, Latvian SSR Academy of Sciences and other academic institutes which are involved in such synthesis. This will require broad utilization of modern scientific methods, mass spectrometers, recording spectrophotometers, computers, NMR spectra and automated analytic apparatus. This provision of a mathematical basis for pharmaceutical synthesis is among the most important tasks of fundamental research. The author reports that Lvov Medical Institute has been responsible for the introduction of 3 new medications since 1956: Pentabismol, an anti-inflammatory; domestic trichloroethylene narcotic; and dimeksid. Some 71 Candidate's and 13 Doctor's dissertations have been defended.

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USE OF COMPUTER EQUIPMENT IN PLANNING OF TASKS FOR PHARMACEUTICAL ESTABLISHMENTS

Moscow FARMATSIYA in Russian No 1, Jan-Feb 86 (manuscript received 20 Jan 85) pp 13-16

[Article by L. V. Koretskaya and V.I. Krikov, Ryazan Medical Institute imeni I. P. Pavlov]

[Abstract] A system of programs has been developed for programmable calculators for use in planning in pharmaceutical organizations. The authors' group has developed and tested 11 programs for such purposes as determination of expected work volumes during the current year, planning of mean annual increase in work, planning of purchasing, financing, costs, productivity of labor, wages and inventory. Instructions for use of the electronic calculators to run the programs are presented. The use of programmable calculators for pharmacy planning is said to be highly effective. References 4 (Russian).

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UDC 615.2/.3:002.6:681.325.67

LINGUISTIC SUPPORT OF LEKARSTVO AUTOMATED INFORMATION RETRIEVAL SYSTEM

Moscow FARMATSIYA in Russian No 1, Jan-Feb 86 (manuscript received 13 Feb 85) pp 21-25

[Article by L. V. Moshkova, All-Union Scientific Research Institute of Pharmacy, Moscow]

[Abstract] A general discussion of the characteristics of modern automated information retrieval systems is presented. The characteristics of some components of the languages used in modern-dialogue, automated information retrieval systems are discussed. The language support for the "Lekarstvo" [drug] automated information retrieval system is based on a classification headings list similar to that used in the state automated scientific and technical information system, a classification scheme utilizing no more than 3 hierarchical levels. The "Lekarstvo" system supplements the state system with 2 additional classification levels specifically designed for drugs. The information retrieval thesaurus used in the "Lekarstvo" system was developed by the methods specified in the state standards, considering the experience gained in the creation of previous thesauruses for medicine, pharmaceutical organization and economics and the biological activity of chemical compounds. References 24: 22 Russian, 2 Western.

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PHARMACEUTICAL INFORMATION OFFICES IN AZERBAIJAN

Moscow FARMATSIYA in Russian No 1, Jan-Feb 86 (manuscript received 20 Jul 85) pp 57-58

[Article by N. M. Naibov and A. I. Rustamov, Azerbaijan Medical Institute imeni N. Narimanov, Baku]

[Abstract] A study was made of the operation of 12 pharmaceutical information offices in Azerbaijan, including 8 which serve polyclinics, 2 which serve combined hospitals and 2 which serve hospitals, representing some 86% of all such offices in the Republic. Three types of pharmaceutical information offices are distinguished: Type 1, which serves a combined hospital, consisting of a hospital plus a polyclinic; Type 2, serving an ordinary hospital; and Type 3, serving an ambulatory polyclinic institution. Questionnaires filled out by physicians served by the information offices indicated that each physician visited the office 0.1 to 1.03 times per month for information on availability of medications (86.6%), instructions and information on medications (11.8%), counter-indications (0.36%), doses (0.27%), prescriptions (0.18%), pharmacologic effects (0.18%), substitutes (0.009), composition of medications (0.09%) and shelf life (0.09%). Shortages of information

materials at the offices are noted. Reference information files are not available as needed. Suggestions are made for improving the work of the information offices, including provision of separate quarters, organization of information offices in the polyclinic sections of combined hospitals, organization of daily communications with all pharmacies in the vicinity, organization of special days for physicians of various specialities at the offices, and organization of short courses for continuing education of personnel operating the offices.

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COMPUTERS IN EMERGENCY MEDICAL SERVICE--SKORAYA POMOSHCH

Moscow IZVESTIYA in Russian 25 Oct 86 p 3

[Article by V. Korneyev, Moscow]

[Abstract] Computers now allow ambulance dispatchers to send the ambulances to the most suitable hospitals by the shortest routes. This article describes the scene at an emergency (skoraya pomoshch) dispatcher's office, with dispatchers sitting at computer displays, answering calls from emergency physicians, reporting location, team present and diagnosis. The dispatcher then coordinates the information and inputs it to the computer which then outputs a selection of three hospitals suitable for the diagnosis given, located as close as possible to the patient, and not overloaded at the moment. When a hospital is selected, the dispatcher inputs the information to the computer, so that the data base contains information needed to produce reports on hospital utilization, performance of the emergency medical team and of the hospitals of the city. Future plans include expansion of the system to encompass routine as well as emergency hospitalizations.

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ELECTROANALGESIA RESEARCH DISCONTINUED

Moscow TRUD in Russian 29 Oct 86 p 2

[Article by A. Pankov, Special Correspondent]

[Abstract] Eduard Mikhaylovich Kastrubin has developed the method of central electroanalgesia and the "elektronarkon-1" and "lenar" machines which implement it. These machines are widely used at many polyclinics and hospitals. They employ the principle of pulsed current stimulation of the cerebral cortex to achieve analgesia. The use of electroanalgesia reduces the requirement for post-operative narcotics by a factor of 2 or 3. Following 6 or 7 sessions of 40 minutes each, patients eact more mildly to unfavorable events, feel better, sleep better and work better. However, the Moscow Oblast Scientific Research Institute of Obstretrics and Gynecology has decided to discontinue pertinent research, reassigning the Laboratory of Clinical Physiology headed by